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THE LABRADOR COAST

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THE B. S. WRIGHT HELD IN THE ICE AT SQUARE ISLAND HARBOR.
(From a photograph by Bradford.)

Frontispiece.

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THE LABRADOR COAST.

A

JOURNAL OF TWO SUMMER CRUISES TO THAT REGION.

WITH NOTES ON ITS EARLY DISCOVERY, ON THE ESKIMO, ON ITS PHYSICAL GEOGRAPHY, GEOLOGY AND NATURAL HISTORY,

BY

ALPHEUS SPRING PACKARD, M.D., PH.D.,

CORRESPONDING MEMBER OF THE AMERICAN GEOGRAPHICAL SOCIETY, NEW YORK; AND OF THE APPALACHIAN MOUNTAIN CLUB, BOSTON.

With Maps and Illustrations.

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Rec. Dec. 7, 1914.

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TO THE MEMORY OF

PAUL A. CHADBOURNE,

LATE PRESIDENT OF WILLIAMS COLLEGE, AND FOR SOME TIME PROFESSOR OF CHEMISTRY AND NATURAL HISTORY IN BOWDOIN COLLEGE, AND WHO CONDUCTED THE FIRST STUDENTS' EXPEDITION FROM WILLIAMS COLLEGE TO LABRADOR,

THIS BOOK IS GRATEFULLY INSCRIBED

BY HIS FORMER PUPIL AND FRIEND, THE AUTHOR, WHO GLADLY ACKNOWLEDGES THE ENCOURAGEMENT AND MANY KINDNESSES RECEIVED FROM HIM IN HIS EARLY STUDENT DAYS.

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PREFACE.

THE Labrador Peninsula is less known than the interior of Africa or the wastes of Siberia. Its rivers are still stocked with salmon; its inland waters are the breeding places of countless birds. Its numerous and deep fiords, and the splendid mountain scenery of the northern coast, with its Arctic ice-fields and thousand bergs, and the Eskimos, christianized and heathen, will never cease to tempt to this threshold of the Arctic regions the hardy explorer or the adventurous yachtsman.

Though this book is mainly based on observations and collections made by the author in his early student days, it was thought that some general and standard account of the Labrador coast, its geography, its people, its fisheries, its geology, as well as its animals and plants, might be useful, even if future explorations of the great fiords and of the interior plateaux and rivers might in time result in far more complete works.

The scientific results, geological and zoological, are reprinted from the Memoirs of the Boston Society of Natural History for 1867. Chapters I, II, III, and VI are reprinted by permission from the Bulletin of the American Geographical Society for 1888. Chapters IV and XIII first appeared in the *American Naturalist*, and Chapter V is reprinted from *Appletons' Journal.*

Sportsmen and ornithologists will be interested in the list of Labrador birds by Mr. L. W. Turner, which has been kind-

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ly revised and brought down to date by Dr. J. A. Allen. Dr. S. H. Scudder has contributed the list of butterflies, and Prof. John Macoun, of Ottawa, Canada, has kindly prepared the list of Labrador plants. The proof of this chapter has, in his absence, been read by Mr. Sereno Watson, Curator of the Harvard Herbarium, and who has kindly made some additional notes and corrections.

Much pains has been taken to render the bibliography complete, and the author is indebted to Dr. Franz Boas and others for several titles and important suggestions; and it is hoped that this feature of the book will recommend it to collectors of *Americana*.

The author also acknowledges his great indebtedness to William Bradford, Esq., the Arctic traveller and artist, for constant aid and courtesies extended while a member of his party, and for the gift of a number of photographs of the coast scenery and of the Eskimos, some of which have been reproduced in this volume.

The results of the three Canadian expeditions to Hudson's Bay under Lieut. A. R. Gordon, R. N., of which Dr. Robert Bell was the naturalist and geologist; and of the journeys of Dr. K. R. Koch, and of Mr. Randle F. Holme, have been included, so that the work has been brought down to date and represents our present knowledge of the coast and interior.

It is hoped that the volume will serve as a guide to the Labrador coast for the use of travellers, yachtsmen, sportsmen, artists, and naturalists, as well as those interested in geographical and historical studies.

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CHAPTER I.

THE PHYSICAL GEOGRAPHY OF LABRADOR.

OUR knowledge of the interior of the Labrador peninsula is still so scanty, owing to its inaccessibility, its unnavigable rivers, the shortness of the summer season, and the lack of game, as well as the enormous numbers of black flies and mosquitoes, that any description of this country must long remain imperfect. The only scientific explorer of the interior is Professor Hind, who ascended the river Moisie, which, however, is a confluent of the St. Lawrence, and is in fact situated only near the borders of Labrador, in the province of Quebec. None of the larger rivers of Labrador have been explored to near their sources; and no one except Indians and but a single employé of the Hudson Bay Company (Mr. McLean) has ever crossed any considerable portion of the interior. And yet the peninsula is well watered with streams, rivers, and chains of lakes. I have been informed by residents that the Indians of the interior, presumably the Mountaineers, can travel in their canoes from the mouth of the Esquimaux River, which empties into the Strait of Belle Isle, across the country to the Hudson Bay posts in Hamilton Inlet. So far as we have been able to gather from maps and the accounts of explorers, such as McLean and Davies, the latter of whom published an account of the Grand or Hamilton

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River, and the Moravian missionaries Kohlmeister and Knoch, who in their "Journal of a Voyage from Okkak" described the Koksoak River and its probable source, as well as from our own scanty observations taken from elevations near the coast, the interior of Labrador is thickly studded with lakes, somewhat as in the Adirondack region of New York, though the interior country is far more broken and mountainous.

It is certainly most desirable that explorers should penetrate this vast and unknown wilderness, however formidable may seem the barriers to travel. These obstacles would be the rapids and water-falls, the long and difficult portages or carries, and the unceasing plague of mosquitoes and black flies. But the annoyance from insects might not be greater than that encountered by explorers in Siberia, or by trout or salmon fishermen in northern New England and Canada, while the difficulties and dangers of river navigation would not compare with those of a passage through the Colorado River. The route which would be most prolific in results would be to ascend the Meshikumau or Esquimaux River from its mouth near Salmon Bay, in the Strait of Belle Isle, to its source, and thence to connect with the probably adjacent source of Grand or Hamilton River to the Hudson Bay post at Rigolet, in Hamilton or Invuktoke Inlet. Another journey which would be productive of good geographical results would be to cross the peninsula from Prince Rupert's Land by way of Rupert River and Lake Mistassini to Hamilton Inlet. The Koksoak River should be explored to its sources, and the low, flat, wooded region of the East Main, lying between Hudson Bay and the Labrador

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coast-region, should be adequately mapped. At present, less is known of the vast region between Hudson Bay and the Atlantic Ocean than of perhaps any region of similar extent in North America; although the results of exploration might be of more value to geographical and geological science than to trade and commerce.

Thanks to the labors of the Moravian missionaries, we now have a much better knowledge of the intricacies of the extreme northern coast of Labrador than is afforded by the charts of the British Admiralty or the United States Coast Survey; and it is to the rare opportunity we have been generously afforded by the officers of the Moravian Society in London and Herrnhut, Saxony, that we are able herewith to present maps which are at least approximately correct, and which must for a long time to come be the only source of any exact knowledge of the multitudinous bays, inlets, promontories, and islands of this exceedingly diversified coast.

The first special map of Northern Labrador to be published was that by the Moravian Brethren Kohlmeister and Knoch. It comprised the northern extremity of Labrador, north of latitude 57°, including Ungava Bay, and appeared in 1814.

Previous to this, Cartwright, in 1792, had published a map of Sandwich Bay and adjacent regions. Then succeeded the general chart of the coast published by Admiral Bayfield, in 1827, and the later charts of the British Admiralty.

In the United States Coast Survey report for 1860, besides an imperfect outline of the coast given in Mr. Lieber's geological map of the Labrador coast, there is

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a special map of Eclipse Harbor surveyed by Lieut.-Commanding A. Murray, United States Navy, and drawn to a scale of $\frac{1}{60,000}$, with the soundings indicated.

About the year 1873 (the date is not given on the copy of the map we have received) appeared a map of that portion of the coast embracing the sites of the principal Moravian stations and lying between N. lat. 55° and 59°. It was prepared by L. T. Reichel from the sketches made by himself, and published in the lack of any authentic maps of the coast. For a copy of this and the map of Aivektôk or Eskimo Bay we are indebted to the officers of the Society in Herrnhut, Saxony. On this map are given the route of the ship-channel from the southward to Hopedale, and thence to the different Moravian stations up to Hebron; also the overland sledge-routes between Port Manvers and Okkak, and the latter station and Hebron. There is also an attempt to give in a general way the elevation of the coast, and the elevation of Kaumajet Mt. and Mt. Kiglapeit is given as 4,000 feet. Scales of German and of English miles are also given.

The second special map was also prepared by Rev. L. T. Reichel, and published in 1873. It gives what is probably by far the most authentic map of Hamilton Inlet and Aivektôk, or Eskimo Bay, and the coast northward, the whole area mapped being comprised between latitudes 53° 20′ and 56° 20′; it is of special value in giving a capital idea of the intricate fiord structure of the coast, and also a census of the white and Eskimo residents.

We have also been favored by B. Latrobe, Esq., Secretary of the Moravian Missions in London, with the

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loan of a MS. map, by the late Rev. Samuel Weiz, of the coast from Byron Bay in latitude 54° 40′ around to the mouth of George River in Ungava Bay, and kindly allowed to copy it.

With the aid of the new maps of Messrs. Reichel and Weiz we have been able to have compiled the new general map of the Labrador coast herewith presented; the southern portion of the coast being reproduced from the British Admiralty and U. S. Coast Survey charts, as well as those of the Hydrographic Office, U. S. Navy Department, as follows:

No. 9.—River and Gulf of St. Lawrence, Newfoundland, Nova Scotia, and the banks adjacent; Sheet 1. English and French Surveys. Published March, 1868.

No. 731.—Anchorages N. E. coast of Labrador, from Br. Surveys. Published Sept., 1876.

No. 809.—Coast of Labrador, Cape St. Charles to Sandwich Bay. Br. Surveys to 1882.

There are in Lt. Gordon's Report of the Hudson Bay Expedition of 1885, charts of the Ottawa Islands in Hudson Bay, and of one of the islands at Cape Chidley.

In its general features the peninsula of Labrador is an oblong mass of Laurentian rocks situated between the 50th and 62d parallels of north latitude. On the eastern or Atlantic coast it rises abruptly from the ocean as an elevated plateau, forming the termination of the Laurentian chain, which here spreads out into a vast waste of hills and low mountains.*

* The mountains in the Quebec Province which appear in the accompanying map are hypothetical, and were wrongly inserted by the artist.

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This plateau of hills and mountains, with barren table-lands, rises abruptly from the sea-level, presenting a lofty but stern and forbidding front to the ocean, throughout the whole extent of 1,100 miles of coast from the Strait of Belle Isle to Cape Wolstenholme.

Mountains.—On the northern shores of the Strait of Belle Isle the general elevation of the coast is from 500 to 800 feet, and the highest mountains are the three Bradore Hills, which are respectively 1,135, 1,220, and 1,264 feet in height. From Château Bay and Cape Charles the coast rises in height northwards, until at Square Island the higher elevations form mountains about 1,000 feet high. Going farther on, the Mealy Mountains, said to rise to an elevation of 1,482 feet, are seen forming a range extending along the peninsula situated between Sandwich Bay and Eskimo Bay, with Hamilton Inlet.

Still higher is Mt. Misery, which we suppose to be the same elevation as Mt. Allagaigai, a noble mountain mass rising to an altitude of 2,170 feet, forming the summit of an elevated plateau region lying half-way between Cape Harrison and Hopedale. It is a conspicuous peak seen when crossing the mouth of Hamilton Inlet, and we well remember the grandeur of its appearance when partly wreathed in clouds, which left its summit so exposed as to make it look much higher than in reality.

The highest elevations in Labrador rise from the irregular coast range between latitude 57° and 60°; and judging from the views published by Dr. Lieber in the U. S. Coast Survey report for 1860, and by Professor Bell in the Report of the Canadian Geological Survey

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for 1884, the scenery of this part of the country is wonderfully wild and grand, rivalling that of the coast of Norway, and of the coast of Greenland, the mountains being about as high as in those regions. According to Prof. Bell: "After passing the Strait of Belle Isle, the Labrador coast continues high and rugged, and although there are some interruptions to the general rule, the elevation of the land near the coast may be said to increase gradually in going northward, until within seventy statute miles of Cape Chudleigh, where it has attained a height of about 6,000 feet above the sea. Beyond this it again diminishes to this cape, where it is 1,500 feet. From what I have seen quoted of Labrador, and from what I have been able to learn through published accounts from the Hudson Bay Company's officers and the natives, and also judging from the indications afforded by the courses of the rivers and streams, the highest land of the peninsula lies near the coast all along, constituting, in fact, a regular range of mountains parallel to the Atlantic seaboard. In a general way, this range becomes progressively narrower from Hamilton Inlet to Cape Chudleigh." * The highest mountains in Labrador were previously said by Messrs. Kohlmeister and Knoch to rise from a chain of high mountains terminating in the lofty peaks near Aulezavik Island and Cape Chidley. One of the smallest of these mountains, Mount Bache, was measured in 1860 by the Eclipse Expedition of the U. S. Coast Survey, and found to be 2,150 feet above the sea-level. This mountain is a gneiss elevation, and a sketch on the geological chart by

* Observations on the Geology, etc., of the Labrador Coast, etc., Rep. of Geological Survey of Canada, 1884, p. 10 DD.

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Mr. Lieber, the geologist of the expedition, shows it to be rounded by glacial action, while lofty, "wild volcanic-looking mountains form a water-shed in the interior, whose craggy peaks have evidently never been ground down by land-ice into domes and rounded tops."

While the highest elevations have never been measured, the height of three of the lesser mountains along this part of the coast appears to have been roughly ascertained. Professor Bell states that the mountains on either side of Nachvak Inlet, about 140 miles south of Cape Chidley, "rise to heights of from 1,500 to 3,400 feet, but a few miles inland, especially on the south side, they appear to attain an altitude of 5,000 to 6,000 feet, which would correspond with the height of The Four Peaks, near the outer coast line, about midway between Nachvak and Cape Chudleigh." The mountains around Nachvak, he adds, "are steep, rough-sided, peaked, and serrated, and have no appearance of having been glaciated, excepting close to the sea-level." These mountains are formed of Laurentian gneiss, "notwithstanding their extraordinary appearance, so different from the smooth, solid, and more or less rounded outlines of the hills composed of these rocks in most other parts of the Dominion." The height of these mountains was evidently roughly estimated from that of an escarpment on the south side of the inlet at the Hudson Bay Company's port, which "rises to a height of 3,400 feet, as ascertained by Commander J. G. Bolton" (p. 14 DD).

According to the British Admiralty chart and the *Newfoundland Pilot*, Cape Chidley rises to a height of 1,500 feet above the sea, and the highest point of the Button Islands has an equal elevation (Bell, p. 17 DD).

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Port Burwell is situated on the island of which Cape Chidley is the northeastern point. This island is separated from the mainland by McLelan's Strait. "Nunaingok is situated on an alluvial flat, extending between the two branches of the strait. The hill which rises steeply on the south side of it is about 700 feet high; but farther in, between the branches and on either side of them, the mountains are from 1,500 to 2,500 feet high, and have ragged tops and sides" (Bell, p. 19 DD).

In his report for 1885 Professor Bell gives no additional measurements of mountains, but observes: "The mountains everywhere in this vicinity [Nachvak Inlet] give evidence of long-continued atmospheric decay. The annual precipitation at the present time is not great, otherwise small glaciers would probably form among these mountains, which lie between latitudes 58° and 60°, and which overlook a sea bearing field-ice for half the year, and from which bergs are never absent. Patches of snow, however, remain throughout the summer in shaded parts of the slopes and on the highest summits, which range from 4,000 to 6,000 feet above the ocean."* Raised beaches were observed on both sides of Nachvak Inlet.

South of the region visited by Professor Bell are the two mountains of Kaumajet and Kiglapeit, both of which are put at an elevation of 4,000 feet on Rev. L. T. Reichel's map. Of these the former constitutes a peninsula, off which lies the island of which Cape Mugford is the eastern promontory; while Kiglapeit forms the great headland lying between Nain and Okkak in latitude about 57°, and of which Port Manvers is one of the indentations.

*Ann. Rep. Geol. Surv. Canada, New Ser., vol. i., 1885, p. 8 DD, 1886.

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From these facts it will be seen that along this part of the northern coast, mountains as high as the Adirondacks, and even the White Mountains of New Hampshire, plunge directly into the sea, and are as wild and sublime as the coast mountains of Norway and Greenland.

Drainage and Rivers.—Of the water-sheds and water-systems of Labrador our knowledge is mostly conjecture, on account of the lack of information regarding the interior. In none of the charts and maps are the rivers and internal lakes accurately represented, and there is the widest discrepancy between the different maps.

The Labrador plateau has an area of about 420,000 square miles. It has a coast-line of about 1,100 miles, stretching from the Strait of Belle Isle to Cape Wolstenholme, and its greatest breadth is said to be 600 miles. It lies between the 49th and 63d parallels of latitude, and the 55th and 79th meridians. Bounded on the east by the Atlantic Ocean, and on the north and west by Hudson Strait and Hudson Bay, its southwestern limits are defined by the Bersiamits, Mistassini, and Rupert rivers. The broadest and in general highest portion of the plateau appears to be in the southern portion of the peninsula, and it is here that the larger rivers appear to take their rise.

From the northern shores of the Gulf of St. Lawrence and Strait of Belle Isle the Labrador plateau rises until it reaches a vast table-land or water-shed in the interior, the edge of which has been reached by Professor Hind in his explorations of the Moisie River.

This elevated region is thought by Professor Hind to attain a height of 2,240 feet above the sea-level. Professor Hind says of the table-land from which the river

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Moisie, and also, probably, the Esquimaux as well as Hamilton rivers take their rise: "It is pre-eminently sterile, and where the country is not burned, caribou moss covers the rocks, with stunted spruce, birch, and aspen in the hollows and deep ravines. The whole of the table-land is strewed with an infinite number of boulders, sometimes three and four deep; these singular erratics are perched on the summit of every mountain and hill, often on the edges of cliffs; and they vary in size from one foot to twenty in diameter. Language fails to depict the awful desolation of the table-land of the Labrador peninsula." This table-land or water-shed is probably more or less parallel to the Strait of Belle Isle, and situated between 100 and 150 miles inland. It probably terminates to the northeast in the Mealy Mountains. Numerous rivers descend the steep southern slope into the Gulf of St. Lawrence. Of these the Moisie and Esquimaux rivers are the largest. They are supposed to arise from a chain of lakes on the summit of the water-shed, which also gives rise to the Kenamou River.

The Moisie River forms part of the St. Lawrence River system. It is 250 miles long, and flows south, emptying into that river near the Bay of Seven Islands, at a point west of Anticosti and opposite the northern shore of the Gaspé Peninsula. From this point the streams running into the Gulf assume, the further we go east, a N. W. and S. E. direction. Such is that of the Meshikumau or Esquimaux River, which empties into the western mouth of the Strait of Belle Isle, at the lower Caribou Island. This stream is about 250 miles long, as I learned from residents, and is only navigable for about

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twelve miles from its mouth by ordinary fishing-boats. There is no large river between this and Hamilton River, which flows into the Atlantic in a direction a little north of east. The latter river seems to flow in a fissure that runs at right angles to the line of upheaval in the syenite and traps of the Atlantic coast; as upon the Gulf coast the rivers flow from the northwest along natural fissures in the earth's crust that run at right angles to the axis of elevation of the Laurentian chain on the north side of the St. Lawrence. In this connection it should be noticed that the fiords on the Atlantic coast of Labrador assume the same direction, and though they agree much in this respect with the direction of those farther south, there is a yet greater west and east course as we go northward toward Cape Chidley, until beyond latitude 58° the fiords run in a N. W. and S. E. direction, especially on the Hudson Bay slope. According to Davies, the Grand or Hamilton River is supposed to rise from a chain of lakes in the "rear of the Seven Islands, and flows for a considerable distance on the top of the ridge, if I may so express it, between the head-waters of the rivers falling into the St. Lawrence and those falling into the Hudson Bay and Strait, for they are said by the Indians to be quite close to the waters of the Grand River on either side." Our author also states that, "two hundred miles from its mouth it forces itself through a range of mountains that seems to border the table-land of the interior, in a succession of tremendous falls and rapids for nearly twenty miles. Above these falls the river flows with a very smooth and even current." McLean in 1830 descended the river from the now abandoned Fort Nasquapee, situated on Lake Petchikapou,

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to its mouth. He had reached the fort from Ungava Bay. Two other important rivers empty into Invuktoke Bay: the Kenamou, which flows in from the south, and the Nasquapee or Northwest River, which is a larger stream with a very circuitous southeasterly course.

Professor Hind gives us the fullest information as to the rivers of this region, and I should regard his map as, in this respect, the most authentic one yet published. The situations of the rivers and lakes as given in our map are copied from his, with the exception of those on the Atlantic coast mapped by Messrs. Reichel and Weiz. Hind, however, strangely ignores the Esquimaux River, which empties into the Strait of Belle Isle.* According to Hind, whose work appeared in 1863, and who obtained his information from employés of the Hudson Bay Company: "The couriers of the Hudson Bay Company traverse the country between Musquano (or Natashquan) and Hamilton Inlet two or three times every year. The journey can be made in fifteen days in canoes, and this route has long been a means of communication between Hamilton Inlet and the Gulf. The St. Augustine forms the great canoe route of the Montagnais through this part of the country. . . . The

* "The Kenamou River, which enters Hamilton Inlet from the south, cuts through the Mealy Mountains thirty miles from the coast; it is a succession of rapids, and scarcely admits of navigation, even by canoes. The Nasquapee or Northwest River falls into the inlet on the north side, nearly opposite the mouth of the Kenamou. The inlet is here twelve miles across. About two miles from its outlet the Nasquapee River passes through a long narrow lake bordered by high mountains. It takes its source in Lake Meshikumau (Great Lake), and the river itself, according to Indian custom, is called by the Nasquapees Meshikumau Shipu. There is a canoe communication between this river and the Ashwanipi, which is shown on two maps, constructed by Montagnais Indians, in my possession."—Hind's "Labrador," ii., 138.

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St. Augustine, falling into a fine bay of the same name, has its source in the lakes and marshes on the table-land, which also give rise to the Kenamou, which falls into Hamilton Inlet. By this route the Montagnais can journey in their canoes from the Gulf of St. Lawrence to Hamilton Inlet in seven days."

The country north of Hamilton Inlet is thus described by one of the Hudson Bay Company's officers (presumably Mr. McLean) who was sent to explore it: "From Northwest River House the Nasquapee River is ascended for about sixty-five miles, when it is left at Mont à Reine Portage. The country from Mont à Reine Portage to Little Seal Lake is as barren and as miserable as can be seen anywhere; the trees are all burnt, and nothing but stones and dry stumps to be seen. On the 1st of July, 1839, the ice was still firm on Meshikumau or Great Lake. There is no wood to build on the shores of that extensive sheet of water; it is only at Gull Nest Lake that wood remains in that direction. The borders of Nasquapee River, when the expedition ascended it in June, were still lined with ice, some of it ten feet thick." (Hind.)

South of Hamilton Inlet, after passing the first range of mountains on leaving the bay, an elevated plateau is gained, says Hind, which continues until the shores of the Gulf of St. Lawrence are approached, when the country becomes more mountainous and slopes rapidly to the seaside. The breadth of the plateau is 100 miles, and it abounds in lakes.

The Atlantic system of streams to the north is one of small rivers flowing into the ocean in an easterly course.

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Ungava Bay receives two important rivers which imperfectly drain the northwestern slope of Western Labrador. The smaller of the two is the Kangutlualuksoak or George River, which empties into the bay in lat. 38° 57′, and is 140 miles long. Its water-shed is said by Kohlmeister and Knoch to be a chain of high mountains which terminates in the lofty peaks of syenite at Aulezavik Island and Cape Chidley.

The two Moravian missionaries mentioned above state in addition that "this chain of mountains may be seen from the Kangutlualuksoak River, in Ungava Bay, which is collateral proof that the neck of land terminated to the north by Cape Chidley is of no great width. Both the Nain and Okak Esquimaux frequently penetrate far enough inland to find the rivers taking a westerly course, consequently towards the Ungava country. They even now and then have reached the woods skirting the estuaries of George and South rivers." These missionaries describe the Koksoak or South River as flowing smoothly through a low, rocky (probably Silurian) district, and emptying into Ungava Bay in lat. 58° 36′. It is said to resemble at its mouth the Thames, and affords anchorage for vessels twenty-four miles from its mouth. This stream probably arises near the source of the Grand or Hamilton River, and flows in a N. N. W. direction, probably along a natural fissure formed by the juncture of the Silurian rocks and Laurentian system.*

* This river is said to have its source in Lake Caniapuscaw, which is 70 miles long and 20 broad, situated in the centre of the peninsula, equidistant from the St. Lawrence, from Ungava and Hamilton Inlet, being 350 miles from each of those points.

"It is rapid and turbulent, flowing through a partially wooded country. At

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At the western political boundary-line between Labrador and Prince Rupert's Land, according to recent maps, we find apparently another water-shed, which on the eastern slope sends a few streams into the Koksoak River, while on its western slope descend several streams which flow in a westerly course into Hudson and James's bays.

Thus it will be seen that these four river systems take their rise from a great water-shed which curves in a southwesterly direction from Labrador along the northern shores of the St. Lawrence River and the Great Lakes.

Lakes.—The following remarks are taken from our memoir on the "Glacial Phenomena of Labrador and Maine."*

Labrador is essentially a *lake* district. Its numerous rivers afford a very imperfect system of drainage to a country densely covered with lakes, ponds, and pools, and morasses innumerable. It resembles in this respect the probable aspect of the Lake or Terrace period in New England and Canada after the Glacial period, when

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South River House (now abandoned) it receives the Washquah River, which forms the route of communication between Ungava Bay and Hamilton Inlet. From this point to the sea (150 miles) the current, though strong, is less broken by rapids; it also widens very much, and ninety miles from its mouth it is a mile in breadth, flowing between high rocky banks, thinly clothed with trees; it is nearly a league in width. Fort Chimo is situated twenty-eight miles from the sea." George's River was ascended by officers of the Hudson Bay Company to establish relations with the Nascopé Indians, near its source. For 220 miles it was, though full of rapids, deep enough for barges. "The general course of the river is north, running parallel to the coast of Labrador, where it is at no time more than 100 miles distant, and often much nearer." (Hind.) We may expect a full description of the region about Fort Chimo when Mr. L. M. Turner's report is issued, as he spent two years at this station.

* Memoirs of the Boston Society of Natural History, i., 210–303, 1866.

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the present broad rivers were only chains of lakes, and may thus be said to be in an embryonic stage, as its river-beds have never been remodelled and scooped out into gentle declivities and broad valleys, nor immense depths of sand and clay deposited to smooth over the inequalities of the rocky surface of the country, such as in the temperate zone render a continent inhabitable throughout its breadth; while in Labrador man can only inhabit the coast, and gain a livelihood from the sea.

We must distinguish two classes in the lakes of Labrador, viz.: the deep mountain *tarns*, lying in the interior, directly upon the summits of the water-sheds; and the far more numerous broad, shallow lakes and pools spread profusely over the surface below the height of land. These last occupy shallow depressions and hollows, most probably excavated by glaciers in valleys which have been simply remodelled by glacial action. The deep tarns, on the contrary, evidently fill original depressions, sinking between lofty ranges of hills. Davies says that in the region about the source of the Hamilton River the lakes are very deep, and lie directly on the height of land, while the ponds on the lowlands are shallow; and, on the other hand, those which directly communicate with the ocean or with the fiords are in general distinguished for their depth. "This almost universal shallowness of the lakes is a singular feature, when the nature of their borders is taken into consideration, as they are generally surrounded by hills, which would lead one to look for a corresponding depth in the lake; but instead of this some are so shallow that for miles there is hardly water enough to float a half-loaded canoe. I am informed by my friend, John McLean, Esq., that this is

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likewise the case with the lakes lying on the water-shed of Ungava Bay. The lakes lying *on* the table-land are said to be deep." He also states that the large lakes in the interior are well stocked with fish, while the shallow lakes, and, in fact, the deep ones communicating with the ocean, are in general very destitute of them.

We must believe that the same causes that produce the deep fiords likewise account for these deep fissures and depressions in the summit of the water-sheds. It is evident that any amount of glacial action, however long sustained and vast in its operation, can never account for these rude, irregular, often "geoclinal," troughs which follow lines of fracture and faults, lying along the axis of elevation of mountain chains, or at nearly right angles to them.

Fiords.—The fiords on the Labrador coast are of great extent and depth. They are either original lines of fracture and faults, or what Professor Dana terms *geoclinal* troughs, occurring at the line of juncture of two rock formations. Thus, Château Bay is a fissure at least 1,200 feet in depth. The western shore rises 600 feet above the sea-level, and the waters of the bay at their deepest are 600 feet in depth. This fault must have been produced at the time of the upheaval of the syenites of the coast.

All the broad, deep bays and fiords on the Atlantic Ocean occur at the juncture of the syenites and gneiss. There are deep bays between Cape St. Lewis and Cape St. Michael's, where syenites rise through the gneiss, producing faults and lines of dislocation. The large bay just north of Cape St. Michael's occurs at the junction of gneiss and "hyperite" rocks. Sandwich Bay

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and Hamilton Inlet were formed by the denudation of the Domino gneiss. Despair Harbor is a deep fiord occurring at the juncture of the "Aulezavik gneiss" of Lieber, with syenitic rocks forming the coast-line between this point and Hopedale. The irregular overflows of trap and syenitic rocks which enclose the gneiss rocks, produce an immense number of cross fiords and channels, from the presence of innumerable islands which line the coast, and are composed of these eruptive rocks.

These original fissures and depressions have been modified by glaciers, by frost and shore-ice and icebergs, and by the waves of the sea.

The shallow lakes, formed most probably by glaciers, lie in shallow troughs, upon a thin bed of gravel and boulders. We only learn in some regions, especially in Southern Labrador, that the country has been covered with boulders by their presence on the banks and in the centre of these pools. Clear examples of lakes partially surrounded by walls of rock, with the banks at one end completed by a barrier of sand and gravel, are frequent. Such barriers of drift have lost entirely their resemblance to glacial moraines, to which they undoubtedly owe their origin, since the drift deposits have been remodelled into sea beaches composed of very coarse gravel and boulders, while the finer materials have been swept away by the powerful "Labrador current," with its burden of icebergs and floe-ice that has so effectually removed traces of the former presence of what we must believe to have been extensive glaciers.

From all that has been published, it would seem that the entire interior of the Labrador peninsula is strewn with boulders, having once been covered with land-ice,

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which flowed into the Atlantic on the east and south, and Hudson Bay on the west and north. The forest growths sometimes clothe the lower hills, but in general are confined to the protected river-valleys and lake basins.

It is to be hoped that at no distant day some skilled explorer, with a sufficient knowledge of geology, may thread the interior of the peninsula from Ungava to Hamilton Inlet, passing thence by the Esquimaux River to the Strait of Belle Isle. The region from the head-waters of the Hamilton River to Hudson Bay should also be traversed, and when this is done we shall be provided with a knowledge of this vast, shadowy, gloomy, forbidding region, of which we now apparently know less than of the interior of Alaska, the tundras of Siberia, or the plateaus of Central Africa.

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CHAPTER II.

WHO FIRST SAW THE LABRADOR COAST?

THOSE rovers of the northern seas, the Norsemen, pushing out from the fiords of Greenland in their one-masted craft, no larger than our coasters or mackerel boats, without doubt sighted and coasted along "the Labrador," nearly five centuries before John Cabot made his first landfall of the American Continent.

The Labrador coast was not, however, the first American land visited by the Norsemen.*

Kohl states that New England was first discovered by Biarne, in 990. It appears that Heriulf, one of the earliest colonists of Greenland, had a son, Biarne, "who, at the time his father went over from Iceland to Greenland, had been absent on a trading voyage in Norway. Returning to Iceland in 990, and finding that his father, with Eric the Red, had gone to the west, he resolved to follow him and to spend the next winter with him in Greenland.

"They boldly set sail to the southwest, but having

* We should acknowledge that, not having access to the primitive sources in which the voyages of the Norsemen to the American shores are described, we have placed our dependence on the account given by a learned German geographer, J. G. Kohl, in his History of the Discovery of Maine, as the most authoritative exposition of early voyages and discoveries in northwestern America. Kohl's views are based on Rafn's Antiquitates Americanæ. (Documentary History of the State of Maine. Collections of the Maine Historical Society. Second Series, Vol. I. 1869).

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encountered northerly storms, after many days' sail they lost their course, and when the weather cleared, they descried land, not, however, like that described to them as 'Greenland.' They saw that it was a much more southern land, and covered with forests. It not being the intention of Biarne to explore new countries, but only to find the residence of his father in Greenland, he improved a southwest wind, and turned to the northeast, and put himself on the track for Greenland. After several days' sailing, during which he discovered and sailed by other well-wooded lands lying on his left, some high and mountainous and bordered by icebergs, he reached Heriulfsnäs, the residence of his father, in Greenland. His return passage occupied nine days, and he speaks of three distinct tracts of land, along which he coasted, one of which he supposed to have been a large island."

So much for the facts taken from the Norse records and sagas. Dr. Kohl then goes on to say: "That Biarne, on this voyage, must have seen some part of the American east coast is clear from his having been driven that way from Iceland by northerly gales. We cannot determine with any certainty what part of our coast he sighted, and what was the southern extent of his cruise. But taking into consideration all circumstances and statements of the report, it appears probable that it was part of the coast of New England, and perhaps Cape Cod, which stands far out to the east. One day and night's sailing with a favorable wind, was, in Iceland and Norway, reckoned to be about the distance of thirty German miles. Two days and 'nights,' therefore, would be sixty German miles, and this is about the distance from Cape Cod in New England to Cape Sable in Nova Scotia."

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That the land first seen by Biarne was necessarily so far south as Cape Cod does not, we would venture to submit, follow from the facts we have quoted. Is it not more probable that the country was some portion of Nova Scotia, a land as much "covered with forests" as New England?

But Dr. Kohl maintains that the second land which was "well-wooded" was Nova Scotia. In his own words:

"The second country seen by Biarne must, then, probably have been Nova Scotia. The distance from Nova Scotia to Newfoundland is about three days' sail; and from Newfoundland to the southern part of Greenland, a Northman navigator, with fresh breezes, might easily sail in four days, and thus Newfoundland was probably the third country discovered by Biarne."

We should not have the hardihood to criticise Dr. Kohl's statements and conclusions, if we had not made two voyages to Labrador, in which we sailed from Cape Cod to Nova Scotia, skirted that coast, approached within a mile of Cape Ray, Newfoundland, and spent a summer on the northern shores of Belle Isle, opposite Newfoundland; and a second summer in coasting Labrador as far north as Hopedale. Hence the general appearances of the Nova Scotian, Newfoundland, and Labrador coasts are, though in a slight degree, to be sure, known to us.

The records state that the southernmost land seen by Biarne was "covered by forests;" this would apply to Nova Scotia as well as to the coast of Massachusetts. It is then said that without landing, improving a southwest wind and steering northeast, "he put himself on the

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track for Greenland." This would be the course from Cape Cod to Nova Scotia, it is true, but such a course would also take him from the eastern end of Nova Scotia to Cape Race, Newfoundland, while from the present position of St. John's the course to the site of the Greenland Norse settlements is a northerly one.

As Kohl states, the distance from Nova Scotia to Newfoundland is about three days' sail; but the wind would have to be strong and fair all the time, for the distance from Halifax to St. John's, Newfoundland, is about 530 miles. A Viking's ship was by no means a modern cutter either in her lines or rig. I have seen in the Sogne fiord a vessel of forty or fifty tons, her hull clumsy and broad, with her single mast placed midships and carrying a square sail; her stern rather high, and her prow rising five or six feet above the bows. A Norwegian friend observed to me at the time, "There," said he, "hang the gunwale of that vessel with shields and fill her with armed men, and you would have a Viking's ship!" We doubt whether Biarne's craft could have made in "one day and night's sailing with a favorable wind," more than 138 statute miles, or thirty German miles. At such a rate it would take from five to six days to go from Halifax to St. John's, Newfoundland. The passage by a swift ocean steamer of the Allan Line requires from forty-two to forty-eight hours.

Passing by Newfoundland, which is well-wooded, except on the more exposed northeastern coast, Biarne, sailing by a land "said to be high and mountainous, and bordered by icebergs, reached Heriulfsnäs." This land could have been none other than the Labrador coast from the mouth of the Strait of Belle Isle northward.

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If Biarne's return passage occupied only nine days, he could not possibly have sailed from Cape Cod to Greenland in that time. A nine days' trip from Boston to the Labrador coast at the mouth of the Strait of Belle Isle is a remarkably short one for an ordinary fishing-schooner.

The distance from Boston to the Greenland coast a little north of Cape Farewell, where the southernmost Norse settlements were made, is about 2,300 miles. The southern coast of Labrador is about half-way. The exact sailing distance from Thomaston, Maine, to Caribou Island, Strait of Belle Isle, Labrador, is 910 miles.

The "Nautilus," the vessel in which I first sailed to Labrador, was a staunch schooner of 140 tons. She sailed from Thomaston, Maine, June 27, and passing around Cape Breton, reached Caribou Island in ten days* (July 7th): after leaving our party on the Labrador coast, she set sail for Greenland July 9th, over nearly the same route as the Norsemen must have taken. From Captain Ranlett of the "Nautilus," I learn that he first sighted land on the coast of Greenland on the 17th, in lat. 62° 58′, and long. 52° 05′. The land next seen was about lat. 63° 10′, long. 50° 45′. This is about fifty miles south of Fiskernaes, and 25 miles north of Frederickshaab. The voyage to Greenland was thus made in about nine days, as the vessel did not reach land before the 18th. The return voyage from Godthaab to Bonne Esperance, Labrador (three miles west from Caribou Island), was made in twelve days. The

* Rev. C. C. Carpenter writes me that he sailed in a fishing-smack from Caribou Island Oct. 3d, and made the shores of Maine on the 13th.

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"Nautilus" left Godthaab Aug. 13th, and entered the Strait of Belle Isle Aug. 24th, anchoring at Bonne Esperance Aug. 25th. Then sailing from Bonne Esperance Aug. 26th, owing to calms and a storm she did not reach Thomaston until September 11th, a period of about fifteen days. It thus appears that the voyage from the mouth of the Penobscot River, Maine, to southern Greenland, through the Gulf of St. Lawrence, a shorter route than that of the Northmen east of Newfoundland, took nineteen days, not including the detention on the Labrador coast, while the return voyage from southern Greenland to Maine required 27 days.

In 1864 my second trip to the Labrador coast was made in a Wellfleet oysterman, a schooner of about 140 tons, built for speed, with long spars and large sails. She was probably the fastest vessel which ever visited the Labrador coast. The voyage from Boston to Mecatina Island on the Labrador coast, through the Gut of Canso, was made in seven days; it was probably the quickest voyage from Massachusetts to Labrador ever made. We ran from Provincetown to Port Mulgrave in the Gut of Canso in just forty-eight hours. The return trip from Caribou Island to Boston, a distance of about nine hundred miles, was made in nine days. The average was therefore just a hundred miles a day. How could a Norseman's clumsy craft of forty or fifty tons, with but a mainsail and a jib, outdo such sailing as that?

The Norse record says that Biarne's "return passage occupied nine days," and Kohl adds that "from Newfoundland to the southern part of Greenland a Northman navigator, with fresh breezes, might easily sail in

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four days. But we have seen that with fresh breezes a modern schooner, at least three times as large as a Viking's ship, required eight or nine days to run from a point but a few miles from northern Newfoundland, *i.e.*, Belle Isle, to southern Greenland. The distance from St. John's, Newfoundland, to the Norsemen's colonies in southern Greenland is not less than 1,500 miles. To perform a voyage of this length in four days would be an impossibility for a modern yacht. It is not impossible, however, that Biarne sailed from southern Newfoundland to Greenland in a period of about nine days. But a voyage from Cape Cod to Greenland by an ordinary schooner requires at least three weeks, or from twenty to thirty days at the most.

Instead then of accepting Kohl's summary of Biarne's voyage stated on p. 63 of his work, we should be inclined to believe, as the results of the expedition, that Biarne was the first European to sight the coast of Newfoundland, possibly the eastern extremity of Nova Scotia, while he also saw the mountainous, desolate, treeless, rocky coast of Labrador.

The next Norse adventurer, Leif, the son of Erik, not only sighted the Labrador coast but landed on it. To this country he gave the name of stony land, or "Helluland," a name perpetuated in an Iceland map of 1570 by Sigurd Stephanius.

The records tell us that Leif, the son of Erik the Red, the first settler in Greenland, having bought Biarne's ship in the year 1000, manned her with a crew of thirty-five men, among whom was Biarne himself, and followed Biarne's track towards the southwest. Kohl then says: "They came first to that land which Biarne

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had last seen, which, as I have said, was probably our Newfoundland. Here they cast anchor and went on shore, for their voyage was not the search of a son after his father, but a decided exploring expedition. They found the country as Biarne had described it, full of ice mountains, desolate, and its shores covered with large flat stones. Leif, therefore, called it 'Helluland' (the stony land)."

Here again we should differ from Kohl as to Leif's first landfall. A southwest course would naturally carry him to the Labrador coast, while the description—"full of ice mountains, desolate, and its shores covered with large flat stones"—well describes the barren, rock-bound, treeless coast of Labrador, in distinction from the much lower, wooded coast of Newfoundland. Moreover, St. John's, Newfoundland, lies nearly due south of the southern extremity of Greenland.

While it is to be doubted whether Biarne ever went south of Newfoundland, we see no reason for disbelieving the conclusions of Rafn and Kohl, that the followers of Biarne, Thorwald and Thorfinn Karlsefne, became familiar with Cape Cod and wintered at Vinland. There is no reasonable doubt but that they landed on Nova Scotia; there is no reason to disbelieve the records which state that they wintered farther west where no snow fell, so that the cattle found their food in the open fields, and wild grapes were abundant, as they certainly are in Rhode Island and southern Massachusetts, as compared with Maine or Nova Scotia.

Without reasonable doubt, then, Helluland of the Norse and Icelandic records is Labrador, though it is not impossible that the bare and rocky coast of north-

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eastern Newfoundland was by some regarded as Helluland. It would be easy for a vessel in those days to pass by without seeing the opening into the Strait of Belle Isle, and, owing to the somewhat similar scenic features of the two lands, to confound the northeastern extremity of Newfoundland with Labrador.

That, as some have claimed, the Norsemen ever sailed through the Strait of Belle Isle, coasted along Southern Labrador and wintered at the mouth of the river St. Lawrence, is certainly not supported by the early Norse records as interpreted by Kohl.

Their vessels sailed to the seaward of Newfoundland. That they did not feel drawn to sojourn in Helluland is no wonder. Its coast presented no more attractions than Greenland, while the grapes, food, and furs, with the verdure and mild winter climate of "Vinland the Good," led to one expedition after another, as late perhaps as 1347, when, according to the Icelandic annals, "a vessel, having a crew of seventeen men, sailed from Iceland to Markland."

Then came the decadence of Norse energy and seamanship, succeeded by the failure of the Greenland colonies, which were overpowered and extinguished by the Eskimo. A dense curtain of oblivion thicker and more impenetrable than the fogs which still wrap the regions of the north, fell upon these hyperborean lands, until, in 1497, the veil was again withdrawn by an English hand.*

Since the foregoing remarks were sent to the printer,

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*The voyage of Szkolney, the Pole, to the coasts of Greenland and Labrador, is stated to have been performed in 1476. See Humboldt, Examen Critique, ii, p. 152. (N. A. Review, July, 1838, 179.)

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Prof. E. N. Horsford's address at the unveiling of the statue of Leif Eriksen has appeared. He also adopts the general opinion that Helluland was Newfoundland, but the language of these extracts convinces us still more that Helluland was Labrador.

In the first translation printed by Prof. Horsford of the Saga of Erik the Red, it is stated in the account of the expedition of Biarne, that after leaving Iceland bound for Greenland, he missed that country and was "borne before the wind for many days, they knew not whither," finally approaching land which "was not mountainous, but covered with wood," with rising ground in many parts. Then sailing two days, and putting the ship about, leaving the land on the left side, he saw land again, "low and level, and overgrown with wood." This land was probably Newfoundland, perhaps the southern or eastern part. We would, however, contend that the next or third land which Biarne saw was Labrador, for the Saga reads: "At length they hoisted sail, and turning their prow from land, they stood out again to sea; and having sailed three days with a south-west wind, they saw land the third time." This land was high and mountainous, and covered with ice. They asked Biarne whether he wished to land here. He said, "No; for this land appears to me little inviting." Without relaxing sail, therefore, they coasted along the shore till they perceived that this was an island. They then put the ship about, with the stern towards land, and stood out again to sea with the same wind, which blowing up very strong, Biarne desired his men to shorten sail, forbidding them to carry more sail than with such a heavy wind would be safe. "When they had thus

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sailed four days, they saw land the fourth time." Towards evening they reached the very promontory not far north of Cape Farewell where Heriulf, the father of Biarne, dwelt.

The high, mountainous land, covered with ice, was probably Labrador near Cape Harrison, or along the coast to the northward, and a Norseman's vessel, with a strong, fair wind, could probably sail from that part of the Labrador coast to near Cape Farewell, a distance of a little over 600 miles, in four days, allowing that a Viking's ship of about 60 tons could sail from eight to ten miles an hour under a spanking breeze. Certainly they could not have made the distance from any part of Newfoundland, which is about 900 miles, in four days.

From the account of the expedition of Leif Eriksen:

"All being now ready, they set sail, and the first land to which they came was that last seen by Biarne.

"They made direct for land, cast anchor, and put out in a boat. Having landed, they found no herbage. All above were frozen heights; and the whole space between these and the sea was occupied by bare flat rocks; whence they judged this to be a barren land. Then said Leif, 'We will not do as Biarne did, who never set foot on shore: I will give a name to this land, and will call it "Helluland" [that is, land of broad stones].'". Here again we have a much better description of Labrador than of northeastern Newfoundland. From there Leif sailed to what he called Markland, or "Land of Woods," which may have been southern Newfoundland, or eastern Nova Scotia, or Cape Breton, as it is but two days' sail from the Gut of Canso to Cape Cod; and the Vinland of Leif was undoubtedly the shore lying east and south of Cape Cod.

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From Mr. J. Elliot Cabot's translation of the Saga relating to Biarne's voyage (Mass. Quart. Rev. 1849, quoted by Horsford), we take the following reference to Helluland. As before, on returning from the south, after turning the bow of his vessel from the land and sailing out to sea for three days with a W.S.W. wind, Biarne saw a third land; "but that land was high, mountainous, and covered with glaciers:" then the wind rose, and they sailed four days to Heriulfsness.

A.D. 999, Leif set sail. "First they found the land which Biarne had found last. Then sailed they to the land and cast anchor, and put off a boat and went ashore, and saw there no grass. Mickle glaciers were over all the higher parts; but it was like a plain of rock from the glaciers to the sea, and it seemed to them that the land was good for nothing. Then said Leif: 'We have not done about this land like Biarne, not to go upon it; now I will give a name to the land and call it "Helluland" [flat-stone land].'"

The northeastern coast of Newfoundland is rather low, not mountainous, is somewhat wooded, with certainly more or less herbage on the outer islands and points. The rock formations are of later age than the Laurentian. We are familiar with the appearance of the Newfoundland side of the Strait of Belle Isle, which decidedly contrasts with that of Labrador opposite.

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CHAPTER III.

THE GEOGRAPHICAL EVOLUTION OF LABRADOR.

JUNE 24th, 1497, a year before Columbus discovered the American continent, the crew of a little vessel, the "Matthew," bound from Bristol on a voyage of discovery to ascertain the shortest line from England to Cathay, sighted land. The vessel was under the command of John Cabot, who was accompanied by his son Sebastian, a lad still under age, perhaps but nineteen or twenty years old. Sebastian kept the ship's log; but the narratives of this, as well as his other voyages, have been lost.

The land was called "Prima vista," and it was believed by Biddle and Humboldt, as well as Kohl and others, that this region which the Cabots first saw was the coast of Labrador in 56° or 58° north latitude. While the narrative of this momentous voyage has been lost, a map of the world ascribed to Sebastian Cabot, and engraved in 1549, contained an inscription, of which we will copy an extract translated in Hakluyt's Voyages (iii. 27).

"In the yeere of our Lord 1497, Iohn Cabot, a Venetian, and his sonne Sebastian (with an English fleet set out from Bristoll) discouered that land which no man before that time had attempted, on the 24 of Iune about fiue of the clocke early in the morning. This land he called Prima vista, that is to say, First seene, because as

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I suppose it was that part whereof they had the first sight from sea. That Island which lieth out before the land, he called the Island of S. Iohn vpon this occasion, as I thinke, because it was discouered vpon the day of Iohn the Baptist. The inhabitants of this Island vse to weare beast skinnes, and haue them in as great estimation as we haue our finest garments. In their warres they vse bowes, arrowes, pikes, darts, woodden clubs, and slings. The soile is barren in some places, and yeildeth little fruit, but it is full of white beares, and stagges farre greater than ours." (Page 27.)

Kohl seems fully persuaded that the landfall of John Cabot was Labrador, because of the presence of white bears.* But if the inscription and map are genuine, the description of the inhabitants of the island, both men and beasts, would better apply to those of the eastern or southern coast of Newfoundland. The human beings were more probably red Indians than Eskimo. On the Labrador coast the soil is "barren" in all places, while the "stagges far greater than ours" may have been the moose, which then abounded and still exists in Newfoundland, and must have been rare, if it ever lived, on the coast of Labrador. Moreover the "white bears" spoken of as being so abundant may have been a white variety of the black bear, or perhaps the "barren ground" pale bear of Sir John Richardson may have been frequent in Newfoundland. It appears to have been of smaller size than the brown bear of Europe, because in Parmenius' account of Newfoundland, published in 1583,

* "This agrees much better with the coast of Labrador than with that of Newfoundland, to which the white bears very seldom, if ever, come down." (Page 133.)

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it is said: "Beares also appear about the fishers' stage of the countrey, and are sometimes killed, but they seeme to be white, as I conjectured by their skinnes, and somewhat lesse than ours." (Hakluyt.)

On the other hand, the true white or polar bear may have frequently visited the eastern coast of Newfoundland, as it formerly abounded on the Labrador coast.

Moreover, nothing is said in the inscription of any ice, which at that date, the 24th of June, so abounds from the Strait of Belle Isle northward to the polar regions. Besides, if we contrast the account of this voyage of the two Cabots in 1497 with that of the younger Cabot the following year, it seems plain that John Cabot's "Prima vista" was Newfoundland rather than Labrador.*

In May, 1498, Sebastian Cabot, under license of Henry VII., in command of two ships, manned with three hundred mariners and volunteers, again sailed to the northwest in search of Cathay. Kohl says: "We have no certain information regarding his route. But he appears to have directed his course again to the country which he had seen the year before on the voyage with his father, our present Labrador." Farther on he remarks: "The Portuguese Galvano, also one of the original and contemporary authorities on Cabot's voyage of 1498, says that, having reached 60° north latitude, he and his men found the air very cold, and great islands of ice, and from thence putting about and finding the land to turn eastward, they trended along by it, to see

* According to Charles Dean, LL.D., in the Critical History of America, vol. iii., John Cabot's landfall was the northern part of Cape Breton Island.

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if it passed on the other side. Then they sailed back again to the south."

From this and other statements by Humboldt and D'Avezac, Kohl concludes that "Cabot in 1498, without doubt, sailed along the coast of Labrador and the western shores of Davis's Strait. Finally, after a struggle with the ice off the Cumberland peninsula in 67½° north latitude, where he probably lost a number of his men, he abandoned any further advance. He then retraced his course southward along the coast of Labrador, and probably came to anchor in some bay on the eastern coast of Newfoundland, where he rested his men and repaired the damage done to his vessels by the Arctic ice. His vessel was probably the forerunner of the fleet of English, Portuguese, Basque, French, and Spanish fishermen which in the next two centuries visited those shores, opening to the Old World a source of revenue more available than the fabled wealth of Cathay.

Still, dreams of the Indies led Cabot on southward, past Newfoundland, past Nova Scotia, along the New England shores, and probably southward near Cape Hatteras, with the hope of finding a direct passage to the East.

Although on their return from their first voyage of 1497 the Cabots believed that the land they had discovered was some part of Asia, to them must be given the credit of beholding the American continent before Columbus; while, with little or no doubt, Sebastian Cabot beheld in July, 1498, the mainland of Labrador, for, says Hakluyt, "Columbus first saw the firme lande, August 1, 1498." *

* Kohl, p. 131, foot-note.

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English seamen, then, were the first to reveal to a world which had forgotten the deeds of the Norsemen the northeastern shores of our continent, and to carry to Europe the news of the wealth of life in the seas of Newfoundland and the Bay of St. Lawrence.

The Cabots were of Italian origin, though Sebastian was born in Bristol. The English did not immediately follow up their discoveries, for the next explorer who ventured near if not within sight of the Labrador coast was a Portuguese, Cortereal, who was commissioned by Emanuel the Great of Portugal, the same enterprising monarch who had previously sent out Vasco de Gama on his voyage around the Cape of Good Hope.

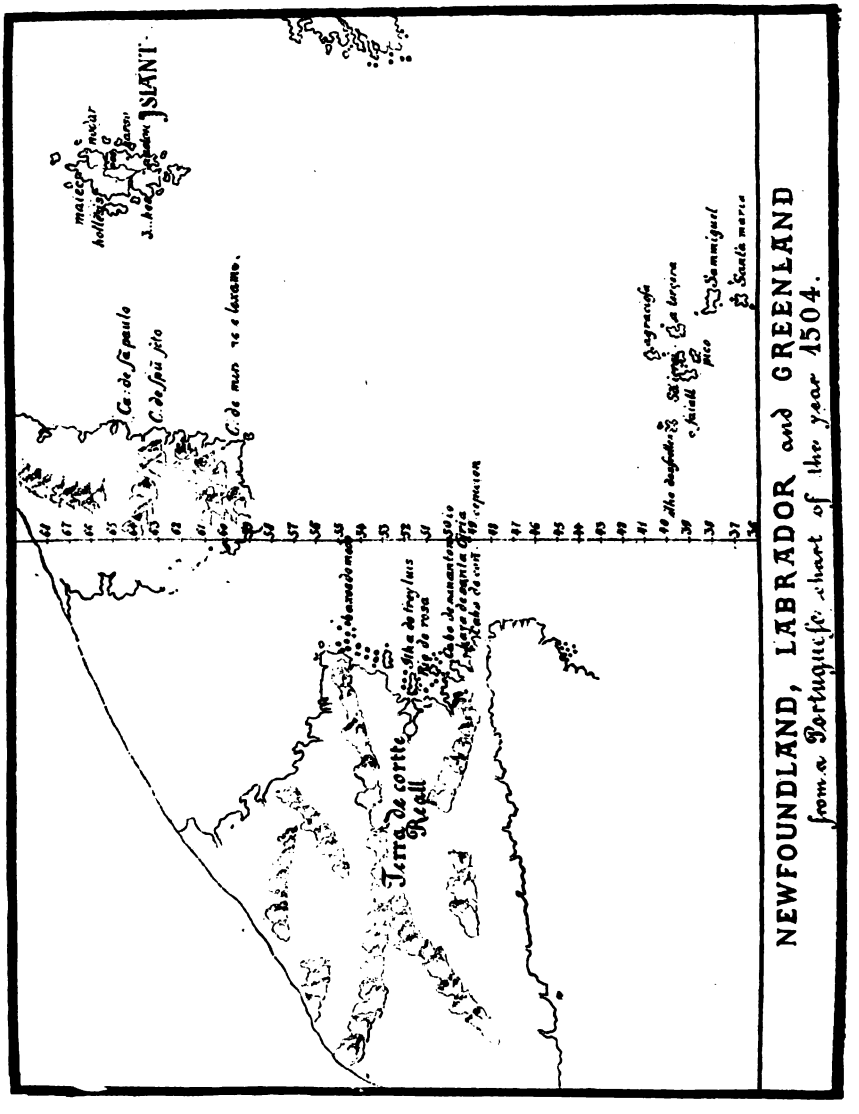
Cortereal sailed from Lisbon in the year 1500. His landfall was Newfoundland near Cape Race, or northward at Conception Bay. From this point he sailed northward, and probably discovered Greenland. He then came to the mouth of a river called by him "Rio nevado," which is supposed to have been near the latitude of Hudson's Strait. Here he is said to have been stopped by ice. He then sailed southward, resting on the east coast of Newfoundland before returning to Lisbon.

The next year Cortereal returned to Newfoundland. He was unable to reach the northern regions on account of the ice, which was more abundant than the year before. On his return his vessel and all aboard foundered, the companion ship reaching Lisbon. The land Cortereal visited was mapped on a Portuguese chart in 1504, and was called "Terra de Cortte Reall." Kohl claims that "the configuration of the coasts and the names written upon them prove that parts of New-

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foundland and of our present Labrador are the regions intended."

As yet the knowledge of Labrador was in embryo,



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Labrador and Newfoundland being a nebulous mass. In a Portuguese map of 1520, nevertheless, we have the name of "Lavrador," which, however, was applied to Greenland, while the Labrador coast and Newfoundland were confounded and given the name "Bacalhaos."

But yet it is to the Portuguese that we owe the name of Labrador. Kohl tells us that "King Emanuel, having heard of the high trees growing in the northern countries, and having seen the aborigines, who appeared so well qualified for labor, thought he had found a new slave-coast like that which he owned in Africa; and dreamed of the tall masts which he would cut, and the men-of-war which he would build, from the forests of the country of the Cortereals."

The word Labrador is a Portuguese and Spanish word for laborer. On a photograph of a Mexican field-hand, or peon, ploughing in a field, which we lately purchased in Mexico, is written "Labrador." In a recent book on Cuba the author thus speaks of a wealthy Cuban planter: "He is, by his own account, a *Hijo de Labrador* (laborer's son) from Alava, in the Basque Provinces."* Cortereal's land was thus the "laborer's land," whence it was hoped slave laborers might be exported to the Portuguese colonies.

The Portuguese also, as is well known, applied to Newfoundland the name Bacalhaos, which means dried codfish or stockfish.

As the result of Cortereal's voyage the Portuguese fishermen through the rest of the 16th century habitually visited the shores and banks of Newfoundland, and undoubtedly were more or less familiar with the Labra-

* A. Gallenga. The Pearl of the Antilles, p. 100. 1874.

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dor coast, for Scandinavian authors report their presence on the Greenland coast. · (Kohl, p. 190.)

In a foot-note to p. 197 of his "Pioneers of France in the New World," Mr. Parkman remarks: "Labrador—*Labratoris Terra*—is so called from the circumstance that Cortereal in the year 1500 stole thence a cargo of Indians for slaves." That the "Indians" were captured on the Labrador coast, however, appears to be an inexact statement. There were probably then no red Indians or timber on the Labrador coast, but Cortereal must have entrapped them in Newfoundland or some place southward. Kohl [p. 169] tells us that "these aborigines, captured according to the custom of the explorers of that day, are described, by an eye-witness who saw them in Lisbon, as tall, well built, and admirably fit for labor. We infer from this statement that they were not Esquimaux from the coast of Labrador, but Indians of the Micmac tribe, inhabitants of Newfoundland and Nova Scotia." The editor of Kohl's work adds a quotation from the Venetian Pasqualigo, who says: "His serene majesty contemplates deriving great advantage from the country not only on account of the timber, of which he has occasion, but of the inhabitants, who are admirably calculated for labor, and are the best slaves I have ever seen."

The path opened by Sebastian Cabot was not only trod by Portuguese, but the Spanish,* Basques, French (Bretons and Normans), and English frequented the rich fishing-banks of Newfoundland, and with little

* "The voyage of Estevan Gomez produced in Spain the same effect which those of the Cabots, of Cortereal, and of the men from Normandy and Brittany had produced in England, Portugal, and France—it conducted the Spaniards to the northwestern fisheries." (Henry Hudson, by Ashler, Hakluyt Soc. p. xcix.)

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doubt visited the Gulf of St. Lawrence and the southern coast of Labrador. Their discoveries were perhaps recorded in Gastaldi's map.

Labrador first became clearly differentiated from Newfoundland by Jacques Cartier. To him we owe

II.



New France by the Italian Jacomo di Gastaldi in about the year 1550

the discovery of the Strait of Belle Isle; of Belle Isle, the Isola De' Demoni of earlier voyages; of Château Bay and other points on the Gulf coast of Labrador.

Sailing from St. Malo the 20th of April, 1534, he arrived May 10th on the eastern coast of Newfoundland, near Cape Buonavista. From this cape Cartier pushed northward until he came to what is now called Fogo Island, which was one of the resorts of the great auk, or

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"penguin" of the early explorers. But we will let Cartier describe the scene which met his eyes in his own words translated by Hakluyt from "The first Relation of Iaques Carthier of S. Malo, of the new land called New France, newly discovered in the yere of our Lord 1534."

"Vpon the 21 of May the winde being in the West, we hoised saile, and sailed toward North and by East from the Cape of Buona Vista vntil we came to the Island of Birds, which was enuironed about with a banke of ice but broken and crackt: notwithstanding the sayd banke, our two boats went thither to take in some birds, whereof there is such plenty, that vnlesse a man did see them, he would thinke it an incredible thing: for albeit the Island (which containeth about a league in circuit) be so full of them, that they seeme to have bene brought thither, and sowed for the nonce, yet are there an hundred folde as many hovering about it as within; some of the which are as big as iays, blacke and white, with beaks like vnto crowes: they lie alwayes vpon the sea: they cannot flie very high, because their wings are so little, and no bigger than halfe ones hand, yet do they flie as swiftly as any birds of the aire leuell to the water; they are also exceeding fat; we named them Aporath. In lesse then halfe an houre we filled two boats full of them, as if they had bene with stones: so that besides them which we did eat fresh, eury ship did powder and salt five or sixe barrels full of them.

"Besides these, there is another kinde of birds which houer in the aire, and ouer the sea, lesser then the others; and these doe all gather themselves together in the Island, and put themselves vnder the wings of other birds

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that are greater: these are named Gódetz. There are also of another sort but bigger, and white which bite even as dogs: those we named Margaulx.

"And albeit the sayd Island be 14 leagues from the maine land, notwithstanding beares come swimming thither to eat of the sayd birds; and our men found one there as great as any cow, and as white as any swan, who in their presence leapt into the sea; and vpon Whitsun mvnday (following our voyage toward the land) we met her by the way, swimming toward land as swiftly as we could saile. So soone as we saw her, we pursued her with our boats, and by maine strength tooke her, whose flesh was as good to be eaten as the flesh of a calfe of two yeres olde."

Cartier then sailed north, entered the Strait of Belle Isle, anchoring at Blanc Sablon, still a settlement east of Bradore Bay.

"White Sand [Blanc Sablon] is a road in the which there is no place guarded from the south, or southeast. But towards south-southwest from the saide road there are two Ilands, one of the which is called Brest Island, and the other the Iland of Birds, in which there is great store of Godetz, and crows with red beaks and red feete: they make their nests in holes vnder the ground euen as conies."

The great French navigator harbored in the ancient port of Brest, near these Islands; the "Iland of Birds," being the present Parroqueet Island, fifteen miles eastward of the mouth of Esquimaux River.

Our voyager then coasted along these forbidding shores to St. James River, where he first saw the natives; "they weare their haire tied on the top like a wreath of

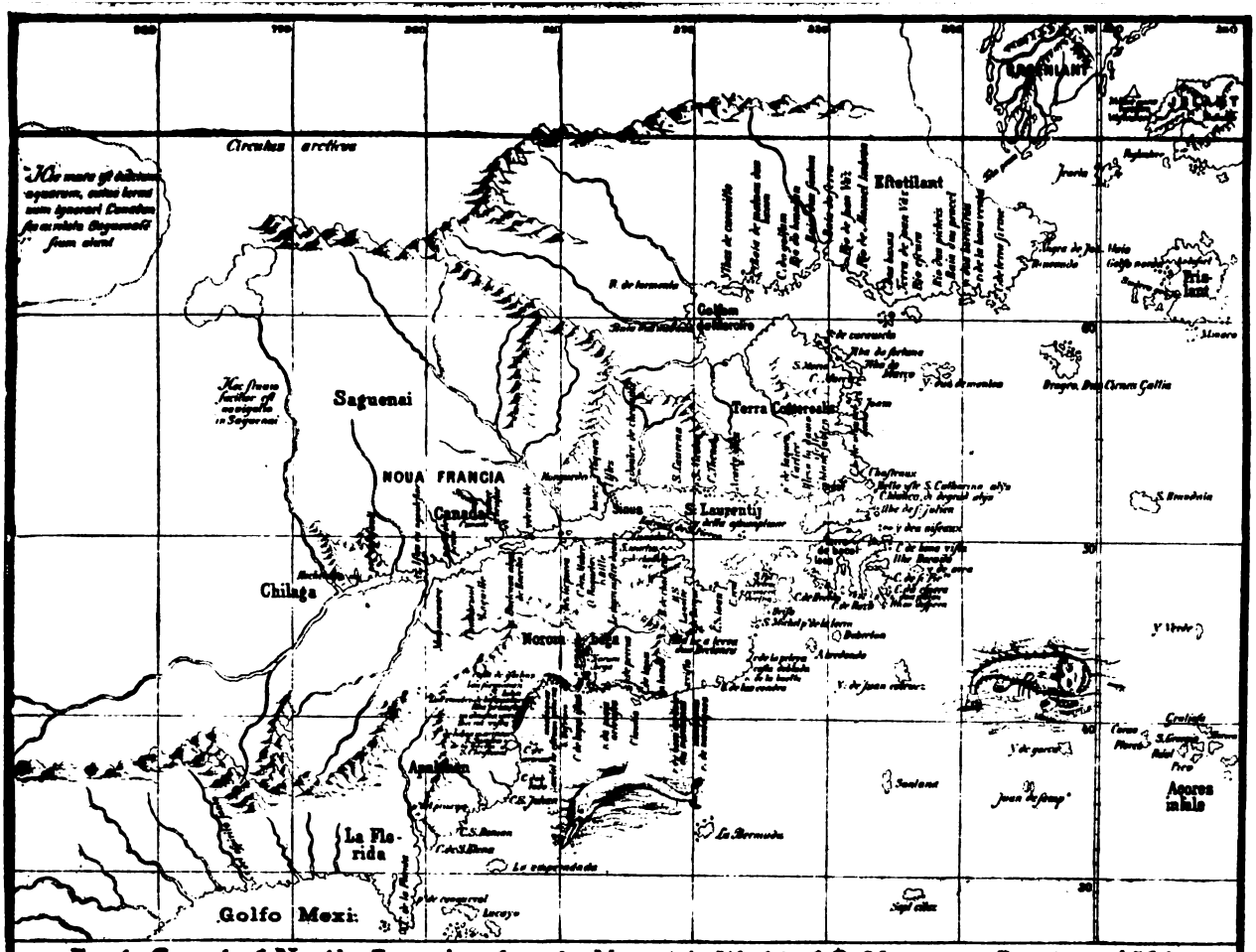
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hay; . . . they paint themselves with certain Roan colors; their boates are made of the barke of birch trees, with the which they fish and take great store of seales, and as farre as we could vnderstand since our comming thither, that is not their habitation, but they come from the maine land out of hotter countries, to catch the saide seals and other necessaries for their liuing." These red men must have been the Mountaineer Indians, which still come down to the coast from the warmer interior each summer to fish for seal. Cartier makes no mention of the Eskimo, who would undoubtedly have been encountered if their roving bands had been living on the coast from Château Bay to the Seven Isles, which he so carefully explored.

This coast appeared to Cartier so disagreeable, unproductive, and barren, that he exclaimed, "It ought to be the country which God had given to Cain." So he crossed the Strait of Belle Isle, sailed over to Newfoundland, coasted that Island to Cape Anguille, which he reached on the 24th of June. From there he sailed over to the Magdalen Islands, to the Bird rocks (Isles aux Margaulx), thence to Prince Edward's Island, thence to Miramichi, afterward to Gaspé Bay, and coasted Anticosti, crossing over again to near and within sight of the Mingan Islands. Not on this voyage discovering the river St. Lawrence, he finally turned homewards, coasting along the Labrador shore, touching at Cape Tiennot, now called Cape Montjoli. Thence he returned to France through the Strait of Belle Isle.

The next year Cartier returned, sailing again through the Strait of Belle Isle; and, coasting along the southern shores of Labrador, discovered the river St. Lawrence.

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East-Coast of North-America from the Map of the World of G. Mercator, Duisburg 1569.

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On his third voyage, Cartier entered the Gulf of St. Lawrence, passing in between Newfoundland and Cape Breton, thus for the first time demonstrating that Newfoundland was an island and not a part of the continent.

The next step in the geographical evolution of Labrador is seen in Mercator's great map of 1569. Kohl tells us that for the compilation of this map Mercator had collected many printed and manuscript maps and charts, and many reports of voyages of discovery. "But," says Kohl, "the best portion of Mercator's work, and a real and valuable improvement upon all former maps, is his delineation of the large peninsula of Labrador, lying southwest of Greenland. On all former maps, that region was ill-shapen and most incorrectly drawn. But here, under the name of 'Terra Corterealis,' it receives its proper shape, with a full and just development, which had not been given to it on any map prior to 1569. He makes its eastern coast run southeast and northwest, as it really does from about 53° to 60° N. In the north he plainly shows the narrow entrance of Hudson's Strait, and at the west of it a large gulf, called by him 'Golfam de Merosro.' This remarkable gulf may be an indication of either Hudson's Bay or only the Bay of Ungava. I think that the latter was meant; first, because the 'Gulf of Merosro' has the longitude of the mouth of the river St. Lawrence, which is also the longitude of the Bay of Ungava; second, because the said gulf is represented as closed in the west. The western coast of the Bay of Ungava runs high up to the north, where Hudson's Strait is often filled with ice. This may have led the unknown discoverers, the informants of Mercator, to suppose that it was closed in the west. If they had

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looked round Cape Wolstenholm into Hudson's Bay, they would have perceived a broad bay and open water before them.

"Mercator does not indicate, so far as I know, the sources from which he derived these remarkable improvements for his chart, which were not known by Homem in 1558, and of which there are only slight indications on the Cabot map of 1544. He adopts the Portuguese names for his 'Terra Corterealis,' namely, 'Golfam de Merosro,' 'Y. dus Demonios,' 'Cabo Marco,' 'Ilha da Fortuna,' 'Baia dus Medaus,' 'Rio de Tormenta,' 'Ylhas de Caravillo,' 'Baia de Malvas,' etc. Some of the names are not new, but had been long known, though not always put in the same position. We know of no official Portuguese exploring expedition made to these regions between the time of Homem (1558) and Mercator (1569); and therefore the suggestions of Dr. Asher, for the solution of this problem, have a high degree of probability. He says:* 'The Portuguese fishermen continued their surveys of the northern coasts,' commenced by Gaspar Cortereal in 1500, 'most likely for no other purpose than to discover advantageous fisheries. They seem to have advanced slowly, step by step, first along the shores of Newfoundland, then up to the mouth of Hudson's Strait, then through that strait, and at last into Hudson's Bay,' or, as I think, into Ungava Bay. 'With a certain number of ancient maps, ranging from 1529 to 1570, before us, we can trace this progress step by step. In 1544,' the time of Cabot's map, 'the Portuguese seem not yet to have reached the mouth of the strait; and in 1570,' or, as I think, 1569, the date of

* See G. M. Asher's "Henry Hudson," Introduction, p. xcvi., London, 1860.

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our Mercator's map,* 'they have reached the bay,' Hudson's, or at least Ungava Bay. 'We can, therefore, state with the greatest certainty that Hudson's Bay,' Hudson's Strait as far as Ungava Bay, . . . 'had been discovered before the publication of Ortelius's atlas, which took place in 1570,' or, better, before the publication of Mercator's chart, which took place in 1569. 'But we are not equally certain that the discovery falls within the years 1558 to 1570,' or, better, 1569, 'because we have only the negative evidence of Diego Homem's chart to support the latter assertion. The fact itself is, however, probable enough.'"

To the English navigators of the 16th and 17th centuries succeeding Cartier we owe the next step in our knowledge of the geography of the Labrador peninsula.

In 1577 Master Martin Frobisher sighted the coast of Northern Labrador, which he called "Frisland," using a word which frequently appears in the early charts. The point he first sighted was probably north of 58°, for after coasting four days along the coast for perhaps a distance of nearly two hundred miles, a voyage of eight days, between the 8th and 16th of July, would carry him to Frobisher's Strait. Moreover his description of the coast applies well to the northern extremity of Labrador beyond Hopedale and Okkak.

The narrative reads thus:

"The 4. of Iuly we came within the making of Frisland. From this shoare 10. or 12. leagues, we met great Islands of yce, of halfe a mile, some more, some

* Dr. Asher does not mention Mercator's map of 1569. He had before him the map of Ortelius of 1570, who was only a follower and copyist of Mercator, but adopted his views.

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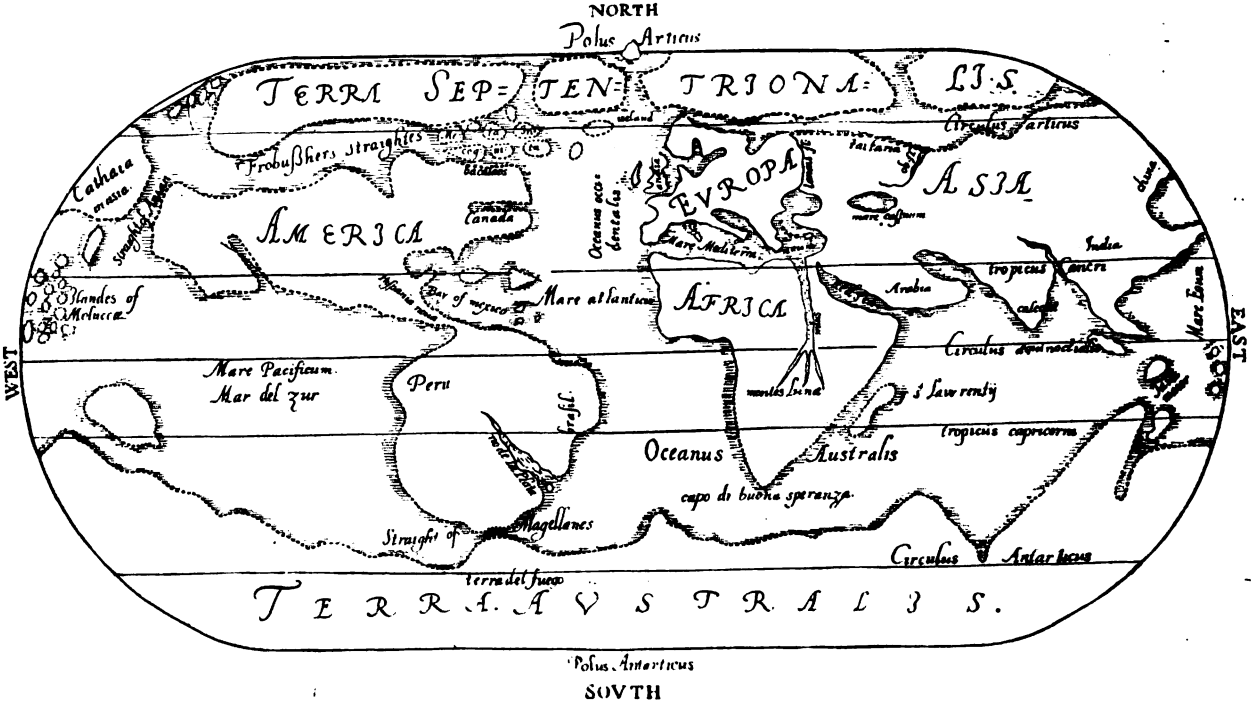
lesse in compasse, shewing above the sea, 30. or 40. fathoms, and as we supposed fast on ground, where with our lead we could scarce sound the bottom for depth.

"Here in place of odoriferous and fragrant smels of sweete gums, and pleasant notes of musicall birdes, which other Countreys in more temperate Zones do yeeld, wee tasted the most boisterous Boreal blasts mixt with snow and haile, in the moneths of Iune and Iuly, nothing inferior to our vntemperate winter; a sudden alteration, and especially in a place of Parallele, where the Pole is not eleuate aboue 61. degrees; at which height other Countreys more to the North, yea vnto 70. degrees, shew themselues more temperate than this doth. All along this coast yce lieth, as a continuall bulwarke, and so defendeth the Country, that those that would land there, incur great danger. Our Generall 3. days together attempted with the ship boate to haue gone on shoare, which for that without great danger he could not accomplish, he deferred it vntil a more convenient time. All along the coast lie very high mountains couered with snow, except in such places, where through the steepenes of the mountains of force it must needs fall. Foure days coasting along this land, we found no signe of habitation. Little birds, which we judged to have lost the shoare, by reason of thicke fogges which that Country is much subiect vnto, came flying into our ships, which causeth us to suppose, that the Country is both more tollerable, and also habitable within, than the outward shoare maketh shew or signification.

"From hence we departed the eight of Iuly; on the 16. of the same, we came with the making of land, which land our Generall the yeere before had named the

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IV.



MAP SHOWING FROBISHER'S DISCOVERIES.

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Queenes foreland, being an Island as we iudge, lying neere the supposed continent with America; and on the other side, opposite to the same, one other Island called Halles Isle, after the name of the Master of the ship, neere adiacent to the firm land, supposed Continent with Asia." (Page. 57.)*

In Rundall† we find it stated that "Frobisher, now left to himself, altered his course, and stood to the S.W.; and, seventeen days afterwards, other land, judged to be LABRADOR, was sighted in latitude 62° 2′ N." (p. 11). In this latitude, however, lies Meta Incognita.

"The great cape seen [by John Davis] on the 31st was designated, it is stated, WARWICK'S FORELAND; and the southern promontory, across the gulf, CAPE CHIDLEY.‡ On this Fox observes: '*Davis and he* [Weymouth, a later navigator] *did, I conceive, light* Hudson into his Streights.' The modern authority before cited expresses a similar opinion; and there is no reason to doubt the fact.

"From Cape Chidley a southerly course was taken to seek the two vessels that were expected to be at the fishing-ground; and on the 10th, in latitude 56° 40′, they had a *frisking gale* at west-northwest. On the 12th, in about latitude 54° 32′, an island was fallen in with which was named Darcie's Island. Here five deer were

* "The second voyage of Master Martin Frobisher, 1577, written by Master Dionise Settle. Hakluyt, vol. iii., New Edition, London, 1810."

† Narratives of Voyages towards the Northwest in search of a passage to Cathay and India. 1496–1631. By Thomas Rundall, Esq., London, Hakluyt Society, 1849, 8°, pp. 259.

‡ "'*The worshippfull M. John Chidley, of Chidley*, in the county of Deuon, esquire,' was apparently chief promoter of an expedition which sailed Anno 1589, for 'the province of Arauco on the coast of Chili, by the streight of Magellan. Of this expedition M. Chidley was also the General. Hakluyt, iv. 357."

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seen, and it was hoped some of them might be killed, but on a party landing, the whole herd, after being twice coursed about the island, 'took the sea and swamme towards ilands distant from that three leagues.' They swam faster than the boat could be pulled, and so escaped. It was represented that one of them 'was as bigge as a good prety cowe, and very fat, their feet as big as oxe feet.'

"The 13th, in seeking a harbour, the vessel struck on a rock and received a leak; which, however, was mended the following day, in latitude 54°, 'in a storm not very outragious at noone.' On the 15th, in latitude 52° 40′, being disappointed in their expectations of finding the *Elizabeth* and *Sunshine*, or of finding any token of those vessels having been in the vicinity, and there being but little wood, with only half a hogshead of fresh water on board, it was determined to shape the course homeward for England. This was accordingly done, and they arrived on the 15th of September in Dartmouth, 'giving thanks to God' for their safe arrival." (Page 49.)

But it is to Davis, after whom Davis Strait was named, that we owe the most exact knowledge of the Labrador coast, until modern times. The following extracts contain all that we can find regarding his exploration of the Labrador coast.

Davis, in the *Moonshine*, left Greenland in latitude 66° 33′ Aug. 1st, 1586. "She crossed the strait in nearly a due westerly direction. The 14th of August she was near Cape Walsingham, in latitude 66° 19′ on the American side. It was too late for anything more than a summary search along the coast. The rest of

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the month, and the first days of September, were spent in that search. Besides the already known openings, namely, Cumberland Strait, Frobisher's Strait, and Hudson's Strait, two more openings were found, *Davis's Inlet* in 56°, and *Ivuctoke Inlet* in 54° 30′. Davis's men had to cross the Atlantic in his miserable craft, and he performed the voyage through the equinoctial gales in little more than three weeks. He reached England again in the beginning of October, 1586." (Henry Hudson, cxv.)

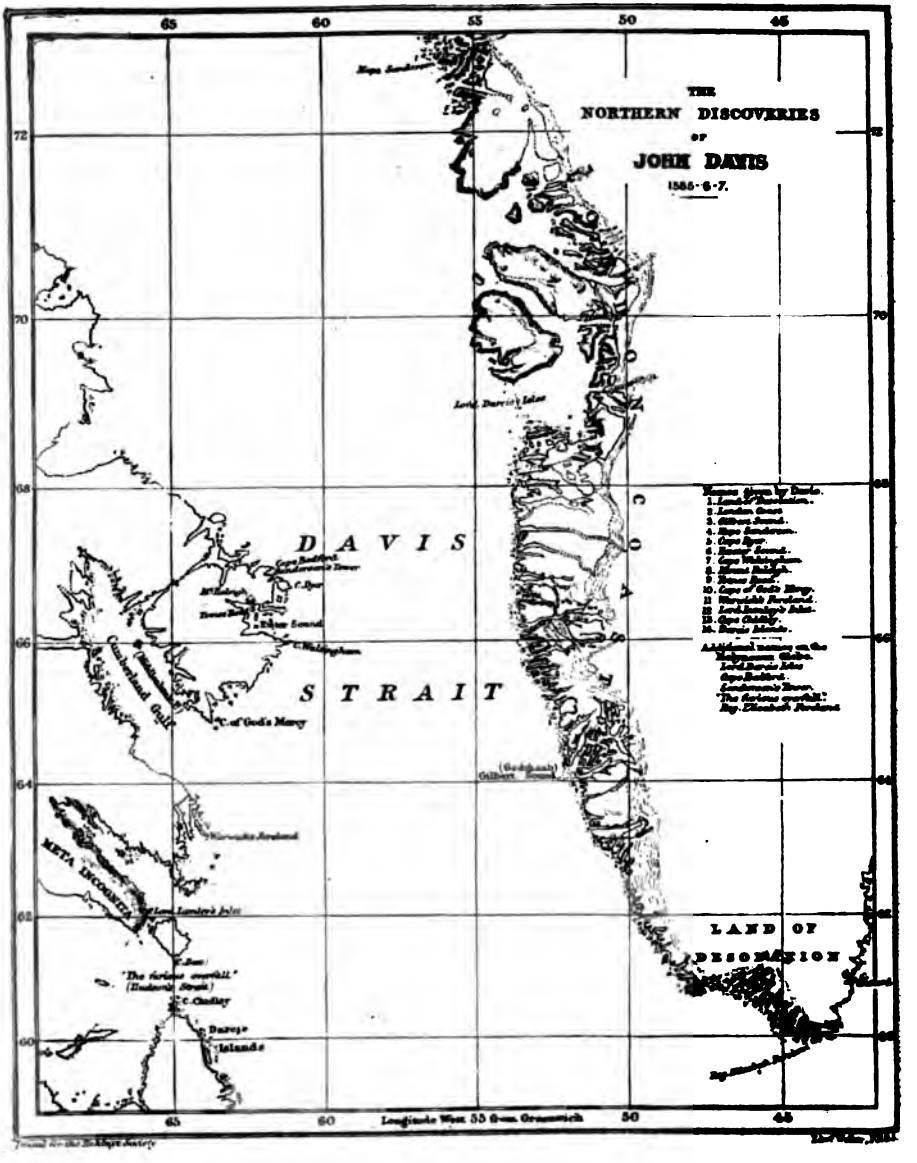
Davis was followed by Weymouth in 1602. According to Rundall:

"From the 5th to the 14th of July, the navigator appears to have been ranging along the coast of Labrador, where, on the 10th, variation 22° 10′ W., he saw many islands. On the 15th he was in latitude 55° 31′, variation 17° 15′ W.; and the day following saw 'a very pleasant low land, all islands,' in latitude N. 55°, variation 18° 12′ W. On the 17th he entered and sailed up an inlet for thirty leagues, in sanguine hope of having found the desired passage; but he was doomed to disappointment. In this inlet, which has been identified with Sleeper's Bay on Davis's Inlet, Weymouth encountered his last peril, and escaped in safety. The flyboats were assailed by a furious storm, which terminated in a whirlwind of extreme violence, that rendered them, for a while, completely unmanageable; and though very strongly built, they took in so much water, for want of spar decks, that they narrowly escaped being swamped. As soon as the weather cleared up, the course was shaped for England." (Page 68.)

The Labrador coast was next seen by Master John

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V.



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Knight, who sailed April 18, 1606, from Gravesend in the *Hopewell*.

"After a most tedious and uninteresting passage, the vessel arrived off some broken land, in latitude 56° 25′ N.: much ice driving to the southward. The wind was fresh and the commander made fast to a piece of ice; but falling calm, he endeavored to row in between the masses. This was an unfortunate attempt. The weather became thick and foggy, and a furious storm arose on June 14: they were driven about in the ice. Lost sight of land till the 19th, when it is described as being seen again, rising like eight islands in latitude 56° 48′ N., variation 25° W. The vessel was then taken into a cove, and made fast by hawsers laid out on shore. On June 26th, Capt. Knight, his mate, and three hands set out, well armed, to explore a large island. They disappeared, having probably been killed by the natives.

"On the night of the 29th, 'they were attacked by savages, who set on them furiously with bows and arrows; and at one time succeeded in obtaining possession of the shallop. However, the eight mariners, with a fierce dog, showed a resolute front, and the assailants, upward of fifty in number, were finally driven off. The savages are represented to have been 'very little people, tawnie colored, thin or no beards, and flat-nosed.' They are also described as being 'man-eaters;' but for this imputation there appears to be no warrant, except in the imagination of the parties on whom the attack was made."

On the 4th of July, the vessel was in great danger of foundering, the craft leaking badly.

"Shaping their course towards Newfoundland, with

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a strong current in their favour, they made Fogo on the 23d of July. At that place they were most hospitably entertained. Having refitted, they left on the 22d of August, full of grateful feelings towards their generous friends; and arrived at Dartmouth on the 24th of December." (Pages 75, 76.)

In 1610 Henry Hudson discovered the strait which bears his name, his discoveries being recorded in the accompanying map, copied from the volume on Henry Hudson published by the Hakluyt Society.

In the narrative of the Voyage of *Sir Thomas Button* (1612–13) we find the following reference to Cape Chidley:

"On this part of the voyage, the following remarks are reported, by Fox, to have been made by *Abacuk Prickett*. 'He saith, they came not through the maine channell of *Fretum Hudson*, nor thorow *Lumley's Inlet;* but through into the *Mare Hyperborum* betwixt those Ilands first discovered and named Chidley's Cape by Captain Davis, and the North part of *America*, called by the Spaniards, who never saw the same, *Cape Labrador*, but it is meet by the N. E. point of *America*, where was contention among them, some maintaining (against others) that them Ilands were the *Resolution*,'" etc. (Page 89.)

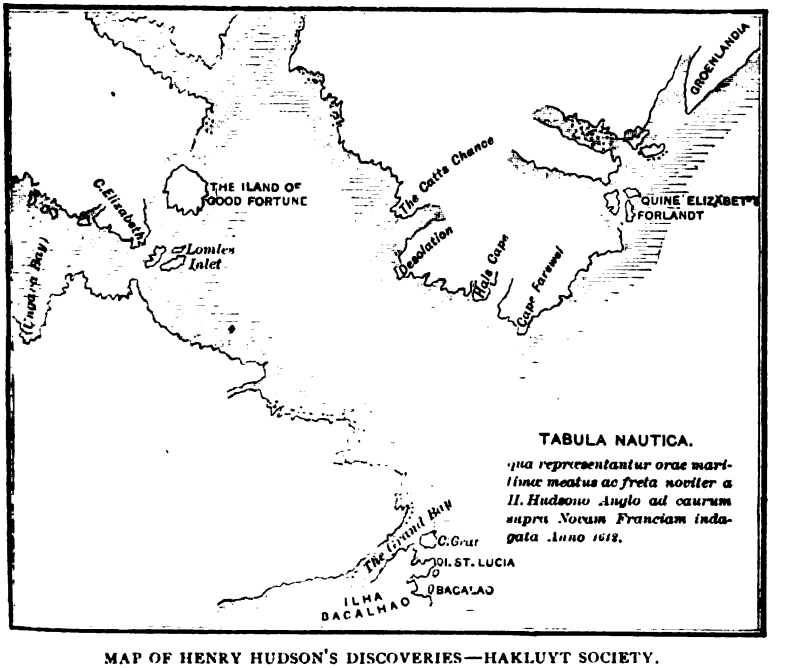
Captain Gibbons, in 1614, appears to have been detained for some months on the Labrador coast.

"Of the result of the voyage, all that is known," says Asher, "is thus laconically communicated by Master Fox: 'Little,' he says, 'is to be writ to any purpose, for that hee was put by the mouth of *Fretum Hudson*, and with the ice driven into a bay called by his company

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GIBBONS HIS HOLE, in latitude about 57° upon the N. E. part of *Stinenia*, where he laid twenty weeks fast amongst the ice, in danger to have been spoyled, or never to have got away, so as the time being lost, hee was inforced to returne.' The bay in which Gibbons was caught is supposed to have been that now called NAIN, on the coast of Labrador." (Page 95. Arctic Voyages, p. 205.)

VI.



MAP OF HENRY HUDSON'S DISCOVERIES—HAKLUYT SOCIETY.

A summary mention of the early voyages we also find in the records of the Hakluyt Society:

"*Hudson's Strait* had been discovered by Sebastian Cabot in 1498. The Portuguese had sailed through it

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and had become acquainted with part of Hudson's Bay between 1558 and 1569. In 1577 Frobisher had by chance entered the strait. In 1602 Weymouth had sailed nearly a hundred leagues into it, from Hatton's Headland to the neighborhood of Hope's Advance Bay.

"The whole *east coast of North America*, from 38° north to the mouth of Hudson's Strait, had been surveyed by Sebastian Cabot in 1498, and part of it before, in 1497, by his father and him. Others had rediscovered various parts. Thus the east of Newfoundland had been explored by Cortereal in 1501; the south coast, by some fishers from Normandy and Brittany in 1504 and 1508. The mouth of the St. Lawrence had also been visited by Cortereal and by these French mariners. The river, nearly up to the lakes, and all the surrounding country, had been thoroughly explored by Jacques Cartier in 1534 and 1535, and afterwards by Roberval and Cartier.

"The *Sandbanks near the mouth of the St. Lawrence*, and the fishing-stations along the Newfoundland coast, were frequented by the English, Portuguese, French, and Spaniards." (H. Hudson, Hakluyt Soc. cxliv.)

After Henry Hudson's voyage, no further explorations were made of the Labrador coast, so far as we can ascertain, until the time of rear-Admiral Bayfield, of the British Navy, who, during the years 1815 to 1827, surveyed and mapped this coast as well as the Gulf of St. Lawrence and Newfoundland. His researches are embodied in the English Admiralty charts, from which the maps of the Labrador peninsula in use up to about 1880 are copied. Of the advances lately made by British and Moravian surveys mention has previously been made.

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To most readers the Labrador coast is still a Meta Incognita, an Ultima Thule, a land of mystery, shrouded by fog and gloom. The ordinary knowledge of it is as vague and indefinite as in the times of Cabot. The period when accurate charts of this intricate coast with its tens of thousands of islands, skiers, and ledges will be made, seems far distant. Local pilots and fishermen from Newfoundland, Nova Scotia, and at times from the United States, with an occasional Newfoundland or Canadian steamer, ply over regularly beaten routes, but owing to the lack of commercial interest in these barren, almost deserted shores, the coast will for years still remain well-nigh beyond the pale of modern interests and thoughts.

In time the Indian and Eskimos will be a people dead and forgotten. The Moravian settlements will be abandoned. Already, owing to the decrease in the cod fishery, famine and want are slowly but surely reducing by removal and death the numbers of the lingering white population, and the coast will be still more desolate and lonely than now.

And yet this coast stands like a protecting, guardian wall between the frozen north and the more temperate, inhabitable regions south and west. Its unexplored bays and rivers will always remain full of interest to our adventurous yachtsmen, as well as to the naturalist, the sportsman, and traveller.

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CHAPTER IV.

LIFE AND NATURE IN SOUTHERN LABRADOR.

THE following recollections of our student days are offered with the suggestion that the more adventuresome of our college boys of the present day might spend to advantage the long summer vacation in cruising on our northern coasts, and combine in agreeable proportions science and travel.

In the summer of 1860, while a student in Bowdoin College, I joined the Williams College expedition to Labrador and Greenland under the charge of Professor P. A. Chadbourne. June 27th found us on board the *Nautilus*, a staunch schooner of about 140 tons, commanded by Capt. Randlett. Soon after five o'clock of a bright, fresh morning our vessel cast off from the wharf at Thomaston, Me. The Thomaston band played a lively air, a clergyman made a parting address, calling down the blessings of Heaven upon the argonauts; our Nestor replied, the students cheering for the citizens of Thomaston and the band, and with a favoring northwest wind the *Nautilus*, gliding down the current of the St. George's River, a deep fiord, in a couple of hours reached the open sea.

Our course lay inside of Monhegan, with its high, bold sea-wall. Passing on, the Camden Hills recede, and we endeavor with the glass to make out the White Moun

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tains, said by some to have been seen by Weymouth from inside of Monhegan. The ocean swell not being conducive to historical controversy, we turn to watch the Mother Carey's chickens and the grampus as well as the fin-back whales sporting in the waves.

By the next morning we had sailed 190 miles from Thomaston, past Cape Sable, and our northwest wind still attending, we bowl along, through schools of porpoise, while two or three whales pass within a few fathoms of our vessel, showing their huge whitish backs. The next day our seven-knot breeze does not fail us, and takes us by the 30th into a region of light winds and calms off the Gut of Canso.

July 1st we sail along Cape Breton Island, its red shores glistening in the noonday sun and then mantled with purple as the sun goes down over Louisbourg. As darkness sets in the lights of Sidney appear. The next morning's sun rose on Cape Ray, around which we beat, passing within a mile of Channels, a fishing-village of Newfoundland, behind which rise steep hills clothed with "tucking-bush," or dwarf spruce and larch. Cape Ray pushes boldly into the sea, its precipitous sides of decomposed sandstone furrowed by the rains which pour down its scarred cheeks, on which still linger banks of the last winter's snows.

By the next evening we pass Cape St. Georges. The 4th was celebrated in the Gulf of St. Lawrence amid fog and rain. It was succeeded by a twenty-four hours' gale, rather severe for the season, which tested the excellent qualities of the *Nautilus* as a sea boat. This being our first storm at sea was enjoyed more keenly than similar gales in after-years. The sea swept our deck, but

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only a few drops entered the cabin. The experience was novel and interesting; fortunately we were not sea-sick; the long waves sloped up like far-reaching hills; sea-birds rode on their crests, and the wind, like a swarm of furies, tore through our rigging. There were but occasional glimpses from the companion-way of our dark, close cabin, redolent with the stench of the bilge-water. The storm abated after sunset, and the morning of the 6th found us only fifty miles from Caribou Island. Towards noon the first iceberg was seen; others came into view, some stranded, others floating on the sea.

The evening was a glorious one; after a gorgeous sunset, the twilight lasting until after ten o'clock, the moon rose upon berg and sea. We were in an arctic ocean; creatures born in the Greenland seas floated past our vessel, and while becalmed at night we fished up from a depth of sixty or seventy fathoms a basket star-fish (*Astrophyton agassizii*) large enough to cover the bottom of a pail.

The impressions made on our minds the next day as we approached the coast and passed in shore, winding through the labyrinth of islands fringing the main land, are ineffaceable. That and other days in Southern Labrador are stamped indelibly on our mind. It was passing from the temperate zone into the life and nature of the arctic regions. There is a strange commingling of life-forms in the Strait of Belle Isle: the flora and fauna of the boreal regions struggling, as it were, to displace the arctic forms established on these shores since the ice period, when Labrador was mantled in perennial snow and ice, when the great auk, the walrus, and the narwhal abounded in the waters of the Gulf of St. Law-

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rence, and the Greenland flora, represented by the *Arenaria grœnlandica*, the dwarf cranberry, and the curlew-berry or black Empetrum, nestled among the snow and ice of the glacier-ridden hills.

We landed on the morning of July 7th, and I was astonished at the richness of the arctic flora which carpeted the more level portions of the island. Groves of dwarfed alders, over which one could look while sitting down, crowded the sides of the valleys, watered by rills of pure ice-cold water. The groves of spruce and hackmatack were of the same lilliputian height. In the glades of these dwarfed forests and scattered over the moss-covered rocks and bogs were *Cornus canadensis*, two varieties in flower; *Kalmia glauca* was in profusion, as attractive a flower as any; the curlew-berry (*Empetrum nigrum*), the dwarf cranberry, with other flowers and grasses characteristic of the arctic and Alpine regions. Particularly noticeable were the clumps of dwarf willow from six inches to a foot in height, now in flower and visited by the arctic humble-bee and other wild bees. Other insects of subarctic and arctic types were numerous, among them a geometrid moth (*Rheumaptera hastata*), which extends from the Alps and snow-fields of Lapland around through Greenland and Labrador to the mountain regions of Maine, New Hampshire, northern New York, Colorado, and Alaska. The flies, beetles, and other forms had an arctic aspect, showing that on the shores of the Strait of Belle Isle the insect fauna is largely tinged with circumpolar forms.

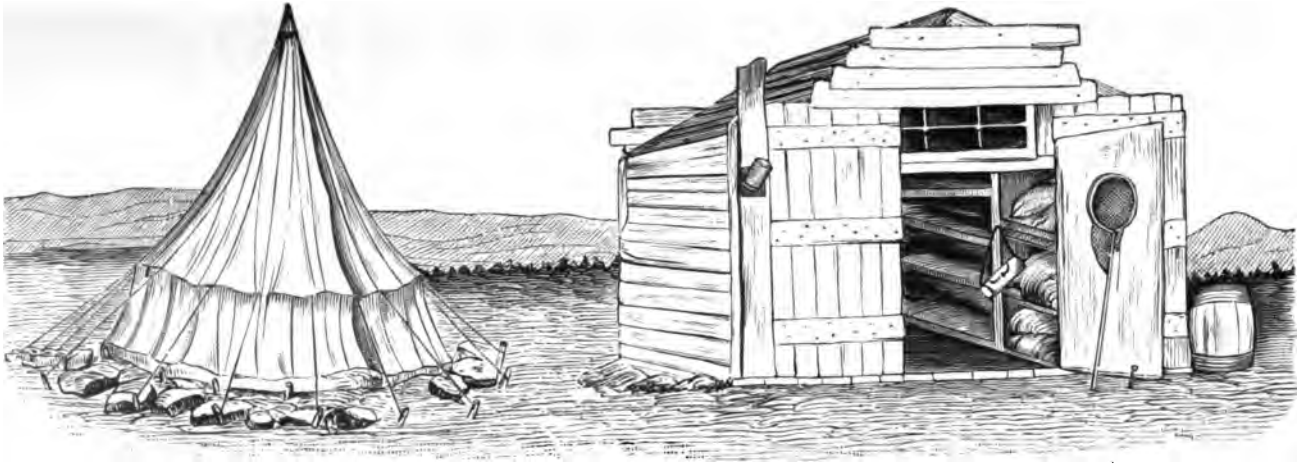
On the 7th of July our party of seven men landed, lodged in a Sibley tent, and the *Nautilus* left us for the

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Greenland seas with the majority of our party. Our tent, provisions, and baggage becoming soaked with the rain and dampness, two days after, we moved over to Caribou Island and built a house of Canada clapboards, kindly loaned for the purpose by the Rev. C. C. Carpenter, missionary to Southern Labrador, for whom a large frame house, sheltering under its roof a chapel, study, and living-rooms, was building.

A Canadian clapboard is twelve inches long and six inches wide; with these and a few joists two of the party built a house twelve feet square, which sheltered us from the sun and the black flies, and only leaked when it stormed, which happened regularly twice a week, usually Wednesdays and Sundays. Six berths were put up on the north side (the seventh man was accommodated in the mission-house); a wide board placed on two flour-barrels at the west end served as a dining and study table, and in the southeast corner a little stove, not over fifteen inches square, with a funnel whose elbow, projecting out-of-doors, had to be turned with every change of wind, was the *focus*, the modernized hearthstone, over which hung our Lares and Penates, sundry hams and pieces of dried beef, *pièces-de-resistance* of our meals, often alleviated by game and fish, clams and scallops or pussels (*Pecten magellanicus*), with entrées of seal and whale flesh. How we college boys cooked and ate, rambled and slept in those seven weeks of subarctic life is a subject of pleasant memory. They were days of rare pleasure, of continuous health, and formed an experience whose value lasted through our future lives. We made hunting, ornithological, entomological, botanical, and dredging expeditions in all

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THE CAMP ON CARIBOU ISLAND. *To face page* 64.

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directions, by sea and land; the geology and the flora and fauna were explored with zeal, and resulted in the discovery of many new forms and the detection of Alpine and arctic European species before unknown to this continent. We investigated the Quaternary formation, ice marks, drift and fossil shells; procured fossils of the Cambrian red sandstone beds, chiefly a sponge (a new species of *Archæocyathus*), which were scattered along the shore, probably derived from the red sandstone strata so well developed at Bradore, also visited by some of our party. The results were perhaps of some importance to science, but the lessons in natural science we learned were of far greater moment to ourselves.

The coast of Labrador is fringed with islands, large and small, from the mouth of the St. Lawrence to Hudson's Strait. A sailboat can go with safety from one point to the other, and only occasionally will be exposed to the ocean swell. These islands are the exact counterpart of each other, differing mainly only in size and altitude. Caribou Island was two or three miles in length, formed of Laurentian gneiss, which had been worn and molded by glaciers. Its scenic features recalled those of the more rugged portions of the coast of Maine, particularly in Penobscot Bay and Mt. Desert. The higher portion of the island is of bare rounded rock, with deep valleys or fissures down which run little rills; these valleys are dense with ferns, shelter many insects, and where they widen out into the lower land support a growth of dwarf spruce, hackmatack and willow. In the more protected parts a few poplars and mountain-ash rise to a height of from ten to fifteen feet.

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The Alpine vegetation is mostly confined to the exposed boggy places or moors, in which are pools of water, supporting water-boatmen, case-worms, aquatic beetles and numerous water-fleas, and an occasional hair-worm or Gordius.

Along the lower portions by the shores are patches of salt marsh with shallow pools of water, which in the spring and autumn are undoubtedly frequented by ducks and geese, though only a few of the former were to be seen. Indeed, I was surprised to see so few sea-fowl. They were principally the parroquet, which abounded on the sea a mile or two away from shore. A favorite breeding-place of this most interesting of arctic birds was in the soft red Cambrian sandstone of Bradore, an island lying fifteen miles easterly from Caribou Island. With their powerful parrot-like beaks they excavate the crumbling rock, extending their galleries in to the distance of several feet. Three of our party made an expedition to this well-known breeding-resort, and in thrusting their hands into the burrows received an occasional bite from the sharp strong bills of the birds which was not soon forgotten. Ducks were occasionally seen, the eider-duck and also the coot, as well as the loon, both the northern diver and the red-necked loon. Shore-birds, particularly the ring-necked plover, and others of its family, abounded, while the most familiar bird was a white-headed sparrow which nested near our camp.

It was not yet the time for the curlews. About the middle of July the sheldrake and coot, which breed in the inland ponds, lead out their young and appear in great numbers. The old ones are wary and hard to shoot, but the young will then be in fine condition. At

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this time the "'longshoremen" abandon their diet of salt pork, bread and molasses, and feast on game, for then, we were assured, they have "great plenty fowl."

In August, also, one or two families of the red Indians or Mountaineers of the interior come down to the mouth of the Esquimaux, or "Hawskimaw" River, as it is pronounced by the settlers, to hunt seal, especially the young, and ducks as well as curlew. These Indians are entirely governed in their wandering by the situation of the deer and other game. One may travel a hundred miles up the Esquimaux River without meeting them.

I saw but a single Esquimau man at Caribou Island. His low stature, his prominent, angular cheek-bones, pentagonal face, and straight black hair sufficiently characterized his stock. The only other native Esquimau was the wife of an Englishman, John Goddard, the "King of Labrador," who lived on a point of land three miles west of Caribou Island. She was a famous hunter, would go out in a boat, shoot a seal and dress it, making boots and moccasins from the skin. Whether these Esquimaux had strayed down from the north or, as I suspect, were the remnants of their people who may have inhabited the entire coast from the Gulf of St. Lawrence to the arctic regions, deserves further investigation.

Few mammals were to be seen. The deer and caribou were confined to the mainland. On our island was a white fox, or rather a blue one, for his summer pelage was of a slate-color. His burrow was situated in a hillside behind our house. He would prowl about our camp at night, and he might have known that it was unsafe to come within reach of our guns. His skin un-

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doubtedly adorns the museum of the Lyceum of Natural History of Williams College.

A weasel also visited our camp. The otter frequents the brooks at the head of Salmon and Esquimaux rivers. In winter they rarely come outside, *i.e.*, to the coast.

It is well known that in Newfoundland the bears, especially those living near shore, will eat fish, their diet being mixed, and such bears are more savage than those in the interior, which live chiefly on berries and ants. While on Caribou Island a fisherman living a mile and a half from us had his sea-trout nets invaded by two old bears accompanied by a young one; at low water they would walk out to the nets, tearing them apart in order to eat the fish.

We were told that a Mr. Hayward, an Englishman who lives at a distance of two miles across the bay, had about ten years since shot the last polar-bear seen on this coast.

Speaking of trout, there are two kinds: one living in the brooks and lakes, the other the sea-trout, a handsome fish about twelve inches in length, whose food we found consisted of a surface-swimming marine shrimp, the *Mysis oculata*, which lives in immense shoals. The sea-trout is taken in nets, and so far as we experimented do not, in salt water, rise to the fly.

Although it was now the 15th of July, the warmer summer weather had not yet come, we were told by the people on shore. There is, however, scarcely any spring in Labrador. The rivers open and the snow disappears by the 10th of June as a rule, and then the short summer is at once ushered in.

Potatoes, and especially turnips, are raised without

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much difficulty as far north as Caribou Island. Rhubarb is said to do well farther up the coast towards the Mecatina Islands. Among the wild-flowers blooming in the middle of July were the dandelion and *Potentilla anserina*. Another Potentilla was the *P. tridentata*, the mountain trident, with its three-toothed leaf and modest white flower. It was pleasant to see this flower, so familiar from my earliest childhood, as it flourishes on the plains of Brunswick, Me., and is common on Mt. Washington as well as on the mountains of Maine, and abounds on the bare spots about Moosehead Lake, particularly at the foot of Mt. Kineo. The wild currant, strawberry, and raspberry were in flower; the strawberry plants were luxuriant, sometimes eight inches in height, but the raspberries were dwarfed, not exceeding the strawberry in height. Up the rivers the raspberries and blackberries are abundant, but the latter low and dwarfish.

The shad bush (*Amelanchier canadensis*) was now in flower, blossoming in southern New England in April or early May, while *Rubus chamæmorus*, the cloud-berry, so abundant in Greenland and Arctic America as well as on the fields of Norway and Sweden, and the "tundras" of Siberia, was going out of flower. With it were associated the star-flower, *Trientalis americana*, a few *Clintonia borealis*, *Smilacina bifoliata* and probably *S. stellata*, *Streptopus amplexifolia*; one or two species of Andromeda; an Iris, species of Vaccinium, the *Arctostaphylus uva-ursi* or bear-berry; the shore-pea, a honeysuckle (*Lonicera cærulea*), a Viburnum, and also the buckbean (*Menyanthes trifoliata*).

Among the flowers fluttered the white butterfly

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(*Pieris frigida*), a *Colias labradorensis*, *Argynnis triclaris*, and some geometrid moths, while a few owlet moths flew out of the grass at the late twilight, which now lasted until near eleven o'clock at night, when fine print could be read.

We were told that the average temperature in June here is 48°, that of July 56°. In the warmer days of summer the thermometer rises from 64° to 68°, rarely to 70°. July 17th was one of the warmest and most pleasant days of the month; the temperature was 60° F. The 21st, however, was much warmer, the thermometer being 72° F.

July 18th was the day of the eclipse; the sun was obscured in the forenoon; the light of day was much modified, though not approaching twilight. The steamer which we saw on the day of the storm in the Gulf of St. Lawrence was without doubt that which bore the Coast Survey eclipse party to Cape Chidley, where the eclipse was total.



PELICAN'S FOOT SHELL.

After roaming over the island and making pretty full collections of the insects, we paid attention to the marine zoölogy. Shore collecting is not as remunerative in Labrador as on the Maine and Massachusetts coasts. The most noticeable form is the six-rayed starfish (*Asteracanthion polaris*), which sometimes measured twenty inches from tip to tip of its opposing rays; its color was a dirty yellowish white.

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not red as in the common five-finger, also abundant. The polar star-fish is common in Greenland, and is a truly arctic form.

The common crab (*Cancer irrorata*) frequently occurred under stones, but the lobster was neither seen nor heard of; though common on the southern shores of Newfoundland it does not reach north into the Strait of Belle Isle. Among the worms which occurred at low-water mark was the Pectinaria. On the New England coast it only occurs in deep water below tide mark.

Dredgings were first made at the mouth of Salmon River, a few rods from shore, in some eight fathoms of water in a firm deep mud. The most characteristic shells were gigantic *Aphrodite grœnlandica*, large cockles (*Cardium islandicum*), as well as the pelican's foot (*Aporrhais occidentalis*), which occurred of good size and in profusion. In the soft mud occurred multitudes of the neat little sand star (*Ophioglypha nodosa*). Another form dredged on rocky bottom was *Cynthia pyriformis*, or the sea peach, and large specimens were cast up by the waves on the beach. Every spare day was given to dredging, and having been deeply interested in marine zoölogy by the writings of Gosse, in England, and of Stimpson in this country, and having obtained a good idea of the local marine fauna of Casco Bay, in Maine, it was with no little interest and expectation that we dropped the dredge in arctic waters, and we were not a little delighted with the result of finding so near shore and in such shallow water, forms which off the coast of Maine, in deep water, were rare and usually but half grown.

July 25th a party of us rowed up Salmon Bay and

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went a mile up the river. The tide was out and we looked for the fresh-water mussel (*Alasmodon arcuata*), which is our northernmost species, and inhabits the rivers of southern Newfoundland. We could find none, although the settlers told us that mussels, clams, and "oysters" were common enough in the river. But something better was discovered. We found traces of genuine Quaternary marine sands and clays containing fossils. There were several banks of sand and clay along the edges of the river. In the latter I found *Aphrodite grœnlandica* and *Aporrhais occidentalis*, with *Buccinum undatum*. They had been washed out of the clay into the bed of the river, and were collected at low-water. I also dug several inches into the clay bank and found the disintegrated shells of the Aphrodite, so as to leave no doubt but that the shells were fossils. Down at the mouth of the stream at the head of the bay, on the flats, I found several *Buccinum undatum*, and quite a number of *Aporrhais*, young and old, broken and entire. On each side of the river was a terrace of sand and clay, with a thick growth of alders and willows, with the fire-weed (*Epilobium angustifolium*), the golden-rod and a large cruciferous plant common in the mountainous parts of New England; also *Comarum palustre*, and a *Thalictrum*. Farther back and mostly lining the banks was a dense growth, impossible to penetrate save occasionally where there was a break in the thicket of spruce and birch, perhaps *Betula populifolia*. Still farther up and away back stretched the bare moss-covered hill-tops, the summer-resort of deer and caribou. Here we saw a ptarmigan. But this was one of our halcyon days, of which there were few, as the last two weeks of

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July were stormy and wet. The clear fair-weather winds were from the southwest; the southeast winds brought in the fog and rain, while the northerly winds brought a few curlew, the advance-guard of the hosts which were to arrive early in August.

The 3d of August was a fine day. A party of us went up the Esquimaux River to Mrs. Chevalier's, whose husband, now dead, entertained Audubon when visiting this coast. The sail up the river was a pleasant one. It was about three miles from its mouth to an expansion of the river on whose shores were four or five winter houses. Although most of the settlers live on the coast through the year, some have their winter and summer houses. Those who live up the interior, sometimes a distance of seventy miles from the coast, where there is wood and game, move from the shore about the 20th of October. They spend a month in cutting wood, a family burning through the winter about thirty cords. Then succeeds a month of hunting and trapping. The snow does not come, we were told, until the last of December, although we should judge this to be an extreme statement, and the snow is not usually more than three feet deep. The people profess to like the winter better than the summer. They shoot deer, foxes, etc., black fox being sometimes secured, whose skin is worth between two and three hundred dollars. Grouse are abundant, a good hunter securing from sixty to seventy a day in favorable seasons. At any rate fresh meat is obtained for each family two or three times a week.

The houses are small, built of wood, boarded and shingled, seldom constructed of logs, and are heated by peculiar stoves, great square structures resembling Dutch

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stoves, and heating the whole house, the two living-rooms opening into each other, the stove being placed partly in each, the partition between the two rooms being cut away to admit the stove.

The French residents at the Mecatina Islands, more social and gayer than the phlegmatic English settlers about the mouth of the Esquimaux and Salmon rivers, spend the winter evening in dancing and other gayeties to which the Anglo-Saxon, in Labrador at least, is a comparative stranger.

The Esquimaux River at its eastern entrance is but a few rods wide. Passing Esquimaux Island we sailed out into a broad bay or expansion of the river, with ravines leading down to it, and under the steep bank protected from the northerly winds were the winter houses previously described. Up the river, just beyond Mrs. Chevalier's, the river contracted into narrows with rapids; it then opened into another bay or expansion two miles wide, the river being a succession of lakes connected by rapids, and this is typical of the rivers and streams of the Labrador peninsula. A barge cannot sail up the Esquimaux River more than fifteen miles, although one can push farther on in a flat boat. We were told that the river is about two hundred miles in length, and although perhaps the largest in Labrador it has never been explored.

Here we met the black flies in full force, and although we had been fearfully annoyed by them in rambling over Caribou Island, here they were astounding, both for numbers and voracity. The black fly lives during its early stages in running water. The insect finds nowhere in the world such favorable conditions for its

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increase as in Labrador, over a third of whose surface is given up to ponds and streams. The insides of the windows of Mrs. Chevalier's house swarmed with these fiends, the children's faces and necks were exanthematous with their bites; the very dogs, great shaggy Newfoundlanders, would run howling into the water and lie down out of their reach, only their noses above the surface. The armies of black flies were supported by light brigades of mosquitoes. No wonder that these entomological pests are a perfect barrier to inland travel; that few people live during summer away from the sweep of the high winds and dwell on the exposed shores of the coast to escape these torments. They are effectual estoppels to inland exploration and settlement.

Accepting our hostess's kind invitation to take dinner, we sat down to a characteristic Labrador midday meal of dough balls swimming in a deep pot of grease with lumps of salt pork, without even potatoes or any dessert; nor did there seem to be any fresh fish. The staples are bread and salt pork; the luxuries game and fish; the delicacies an occasional mess of potatoes, brought down the St. Lawrence once a year in Fortin's trading schooner.

Over the mantelpiece was a stuffed Canada grouse or partridge and a ptarmigan in its winter plumage; but I was most delighted with the gift of some Quaternary fossils with which Mrs. Chevalier kindly presented me, including large specimens of *Cardita borealis*, *Aporrhais occidentalis* and, most valuable of all, the valves of a brachiopod shell, which I had also dredged on the coast in ten fathoms, the *Hypothyris psittacea*. On our return down the river we fished up the valves of the

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Pecten magellanicus, the great scallop shell, which lives in five or six feet of water. This mollusc, which is locally known in Labrador by the name of "pussel," we afterwards obtained in quantity, fried it in butter and meal, finding it to be delicious eating, combining the properties of the clam and oyster, the single large adductor muscle being far more tender than that of the common scallop of southern New England and New York.

With our man, James Mosier, and his sailboat we spent two days in dredging in from forty to fifty fathoms out in the Strait of Belle Isle, three or four miles from land. The collection was a valuable one, containing some new species. The crown of the bank which we raked with our poorly constructed dredge was packed with starfish, polyzoans (including a coral-like form, or myriozoum), ascidians, shells, worms, and crustacea. The collection was purely arctic, and had not the only dredge I had become broken, we should have reaped, or rather dredged, a rich harvest. As it was, the novelties were quite numerous, and the interest and excitement, as well as labor, of overhauling, sorting, and preserving what we did obtain lasted for several days.

The only plant besides stony vegetable growths called "nullipores" dredged at this depth was a delicate red sea-weed, the *Ptilota elegans*, which was found afterwards to extend as far down in depth as ninety fathoms. Those who glibly talk, on *terra firma*, of plant life as affording a basis for animal life, should dredge in deep water. They will find that a vast population of animals of all sorts and conditions in the scale of life is spread at all depths over the sea-bottom, thriving almost with-

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out exception on one another—on animal protoplasm—and in the beginning of creation animal life was without doubt contemporaneous in appearance with vegetable existence. Indeed, what is the difference in form and structure between a bacterium and a moner? The two worlds of plant and animal life arise from the same base, a common foundation of simplest structure, showing



A BRANCHING POLYZOON. *Myriozoum subgracile.* (Natural size.)

none of the distinctive characteristics of animal or plant life, and only barely earning the right to be called organisms, that vague term we apply for convenience to any, even the simplest structures endowed with life.

Of all the pleasures of a naturalist's existence, dredging has been, to our mind, the most intense. The severe exertion, the swimming brain, the qualms of sea-sickness, tired arms and a broken back, the memory of all these fade away at the sight of the new world of life, or at least the samples of such a world, which lie wriggling and sprawling on the deck of the sailboat, or sink out of sight in the mud and ooze of the dredge, to be brought

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to light by vigorous dashes of water drawn in over the side of the boat. Those days of dredging on the Labrador coast, where there was such an abundance and luxuriance of arctic varieties, were days never to be forgotten. There is a nameless charm, to our mind, in everything pertaining to the far north, the arctic world, and we can easily appreciate the fascination which leads one back again to the polar regions, even if hunger and frost had once threatened life. Arctic exploration has but begun, and though its victims will yet be numbered by the score, enthusiasts will still attempt the dangers of arctic navigation, and fresh trophies will yet be won.

Early in August, during the few still clear nights succeeding bright and pleasant days, we had auroras of wondrous beauty, not excelled by any depicted by arctic voyagers.

On the 10th of August the curlews appeared in great numbers. On that day we saw a flock which may have been a mile long and nearly as broad; there must have been in that flock four or five thousand! The sum total of their notes sounded at times like the wind whistling through the ropes of a thousand-ton vessel; at others the sound seemed like the jingling of multitudes of sleigh-bells. The flock soon after appearing would subdivide into squadrons and smaller assemblies, scattering over the island and feeding on the curlew-berries now ripe. The small plover-like birds also appeared in flocks. The cloud-berry was now ripe and supplied dainty tid-bits to these birds.

By the 18th of the month the golden rods were in flower. Here, as has been noticed in arctic regions, few bees and wasps visit the flowers; the great majority of

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insect visitors are flies (Muscidæ), especially the flesh fly and allied forms. A bumble-bee occasionally presents himself, more rarely a wasp, with an occasional ichneumon fly, but the two-winged flies, and those of not many species, were constant visitors to the August flowers. The black flies still remained to this date terrible scourges in calm weather, though in cloudy days and at night they mostly disappeared.

Wandering through the fog and drizzle along the mud flats on the northern side of the island I picked up *Aporrhais occidentalis*, *Fusus tornatus*, *Cardita borealis*, large valves of *Saxicava rugosa*, Buccinum and *Astarte sulcata* and *compressa*; these and *Pecten islandicus* and other shells forming much the same assemblage as I had dredged a few days previous out in the straits in fifty fathoms. The only recent shells lying about were shallow-water forms, such as the common clam, *Tellina fusca* and the razor shell. It was evident that here was a raised sea-bottom, and the Quaternary formation. In the afternoon I returned to the spot and dug up many more shells mingled with pieces of a yellow limestone containing Silurian fossils, brachiopods, and corals. This horizon, then, represented a deep sea-bottom, over which the open sea must have stood at least 300 feet, while the clay fossils of the mouth of the Esquimaux River must have lived in a deep muddy bay sheltered from the waves and currents of the open sea. The drift deposits of Labrador are scanty in extent compared with those of the Maine coast. They are but isolated patches compared with the extensive beds of sand and clay which compose the Quaternary deposits of New England.

On the 22d August we made our last excursion up

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the Esquimaux River, going up some six miles from its mouth. From a hill-top I could look over the surface of this lake-dotted land. The surface was rugged and bare in the extreme. The river valley, however, was well wooded, the spruce and birch perhaps thirty feet in height. Here and there the river passed through high precipitous banks of sand. The hills were rough, scarred with ravines, precipices, and deep gaps, the syenite wearing into irregularly hummocky hills, the rough places not filled up with drift, and thus the contours tamed down as in New England. Indeed, Labrador at the present day is like New England at the close of the ice period or at the beginning of the epoch of great rivers, before the terraces were laid down and the country adapted for man's residence. Labrador was never adapted for any except scattered nomad tribes. It is still an unfinished land.

While the hills were bare and the rocks covered with the reindeer moss, here and there by the river's edge in favorable, protected places were tall alders and willows, with groups of asters and golden rods. Here I saw a veritable toad, and glad enough was I to recognize his lineaments. I was also told that there were frogs in existence, though we never saw or heard them. There are no snakes or lizards, so that our history of these animals in Labrador will be as brief as that of the Irish historian, but we did find a small salamander at Belles Amours in a later trip to this coast.

On our return we found that a whaler had towed a whale into the mouth of the river and was about to try out the oil. We secured a piece of the flesh, and on reaching camp boiled it; it was not bad eating, tasting

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like coarse beef. Seal's flippers we also found not to be distasteful, though never to be regarded as a delicacy.

Dredging and collecting insects on fine days when not too calm filled up the measure of our seven weeks. The time passed rapidly, the days were too short for all the work we planned to do, and it was not without regret that we left the rugged untamed shores of "the Labrador." On the afternoon of the very day she had set for her return to Caribou Island, the *Nautilus* hove in sight. As she made our harbor she struck upon a sunken rock, tore off a piece of her keel, but slid off and came to anchor as near as practicable to the mission house, and then succeeded the mutual spinning of Labrador and Greenland yarns by the reunited party.

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CHAPTER V.

ONE OF FIFTY DAYS IN SOUTHERN LABRADOR.

FOUR o'clock Saturday morning, July 7th, 1860, in the Strait of Belle Isle, and that huge rampart of rock, these few icebergs stranded here and there, this occasional lump of floe-ice floating down with the tide, these outlandish puffins, and large flocks of eider-ducks skimming the surface or flying high overheard, tell us that, after nine days of sailing, we are sighting the Labrador coast.

Here codfish grow largest and most numerous; so twenty thousand fishermen from the British colonies and about five thousand Yankees migrate hither every summer for the cod, herring, and salmon that swarm in these icy waters. Here, in the spring of the year, numbers of hardy Newfoundland sealers risk their lives in the ice just breaking up; while all the year round there are estimated to be five thousand Esquimaux, Micmacs, Englishmen, Frenchmen, Jerseymen, and half-breeds, who live, thanks to the codfish, on these favored shores. Here people are born, live, and die, who have never seen a horse, cow, sheep, or cat, or a civilized dog. Wild Esquimaux dogs, savage, wolfish creatures, are the only beasts of burden.

The animals and birds are half arctic and half temperate. Sweet, dwarfish, arctic flowers here nestle in beds of reindeer-moss, while our Alpine flora one may gather

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on Mount Washington luxuriates with stunted growths of bushy firs and birches. So, nearly all the shells, worms, and creeping things are the same in kind and number as those that Otho Fabricius wrote of in his "Fauna Grönlandica," during his dreary life in southern Greenland one hundred years ago.

As we approach land no capes run out to greet us, or sheltered harbor opens its arms to embrace. An uninterrupted line of coast confronts the gulf. In one place alone is the intense monotony of the outline relieved by the Hills of Bradore, where the coast sweeps round fifteen miles to the eastward, and the Strait widens out.

It is a charming morning, the sun up but an hour, and just breeze enough to move us over the placid sea. Flocks of grave, enormous-hook-billed puffins sweep by us in squadrons of fifties and hundreds, or flocks of eider-ducks fly swiftly out from the land. Coming up nearer to this strange coast, the line breaks here and there; a few rocks and islands start out from the shore. We pass by schools of two-masted fishing-boats, with two men apiece hooking codfish; we hail the fellows, but they are too busy to look up. Things look a little more lively; more islands appear, channels wind through them, choked with fleets of fishing-smacks. But the wind leaves us, so we put out a boat and are towed through these narrow passages, whose walls of rock rise on each side higher than the masts of our schooner, though not very precipitously, for all has been worn down and subdued by water. So we move along, as if on a smooth-flowing, deep, narrow river, or a Norwegian fiord; now we round a point, and can almost jump ashore; then a bend in the channel takes us over to the other side; now

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we luff a little to avoid a group of Nova Scotia fishermen, fat, sleek, moon-faced fellows, whose boats, loaded with fish, are busy discharging their burden, pitching up on deck half-dead cod, which are seized in a trice by groups of "headers," "splitters," and "gutters." And then the multitudinous smells, now coming fierce and strong from deck and hold, anon gentle and spicy as the cook turns the morning fry. Now the surface is streaked with oily films, but these break away and disclose, six or eight fathoms below, a clear, sandy bottom, strewed with fish offal, on which banks of sea-urchins feed. If we look long and steadily enough, we shall see swarms of beautiful, delicate, transparent jelly-fish, with an occasional Clio, a winged mollusk, fully as pure and beautiful, only more transparent. Suddenly the bottom is obscured by an immense shoal of caplin, slowly swimming just above the bottom. The rocks now reveal green, sunny declivities; little valleys, sprinkled with flowers; an arctic butterfly comes out to our vessel; and now we open upon a house; it is only a deserted fish-house, but a cur, keeping up an incessant barking on the other side of the hill, lets us know that there are human beings, as well as canine, not far off. If we may believe it, there is a small, stunted, homely, Quebec cow feeding on the side of the hill. Here was a clear case of unnatural selection. The scenic features of this coast do not demand a cow to grace the foreground. Her nautical owner informs us, in sturdy Labradorian dialect, that she had been brought up this spring. "I made her fast to her moorings, and there let her bide to eat the grass." Her husband had broken loose from his moorings, and was emulating the roar of the waves on the "land-wash."

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The children, more used to seals and sea-cows, had not yet recovered from their astonishment at this freak of Nature.

The channel now widens out into the bay of Bonne Espérance, a fine open space of water, tolerably well sheltered from storms. Two days after I got settled on Caribou Island, in Salmon Bay, three miles east of Bonne Espérance.

Nearly the whole coast of Labrador is lined with multitudes of small islands, separated by deep, narrow channels from the mainland, with here and there a bay of some extent, where the islands are separated far apart. Thus, a small sail-boat can start from the mouth of the St. Lawrence, and take an inside passage up to the Strait of Belle Isle, and there will only be a few places where she will encounter the outside swell. These numberless islets and channels are too numerous and intricate to be accurately mapped. At least, our ordinary charts give no accurate idea of their location, and navigation for the whole coast is a matter of guess-work.

Caribou Island is the largest within fifty miles, perhaps, of Salmon Bay. It is about two miles long and half as broad. But it is in vain to guess about the length or breadth of any part of this rough-and-tumble country, so I will measure it with my legs. It is a fresh, cool, breezy morning; thermometer, say, at 56°. At noon it will not be higher than 65°.

At the outset, it may as well be said that this is no country for slippers or calfskin boots of ordinary make. Here Jersey cowhide or native-made sealskin boots are the *mode*. With anything on but these, two minutes' walk out-doors will wet one's feet thoroughly, so wet

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and soaked is the boggy ground. For bog-trotting, or moss-tramping, or climbing rocks, sealskins *à la Esquimaux*, so light and water-tight, are indispensable.

The way lies round the head of a little bay, which meets a quiet vale, filled with grass and ferns at the top, but half-way down, as it widens out, choked with a stunted spruce and fir growth, or what the people call "tucking," or "tuckermel-bush." It is in vain that we try to push through it, so dense the growth, so gnarled, twisted, and grown together in one impenetrable mass the trunks, and so flat and table-like the branches spread out above. Here is a perfectly tight shelter, should it rain. Many a hunter, belated at nightfall, has crept under these bushes and made a comfortable night of it. So the bears find good hiding-places here, and cannot be found without dogs to scent them out. Lower down, the valley extends into an alder-swamp, a lilliputian growth, perhaps three feet high, choked with rank grasses and sedges, crowding the sides of a slow-moving brook. Here mosquitoes and black-flies swarm; we are under shelter of a cliff, and there is no wind to keep off these horrible pests. How they rage and torment, these myriad entomological furies! Now for a frantic rush out of this purgatory, and a tiresome climb of a hundred feet up this cliff! It is high, but not very rough, for all the rocks are hidden by soft reindeer-moss, and the crevices are filled up with tuckermel, and the ravines that run down its sides have their dripping, mossy walls sprinkled over with Alpine flowers and their bottoms carpeted with coarse arctic grasses. Only here and there patches of the original granite show themselves. Now and then a brown or yellow butterfly flits by, or an arc-

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tic bumble-bee hums and buzzes in the flowers; two or three beetles crawl over the fern-leaves, while a few meagre, lean-looking flies lead a sort of doubtful existence. There is none of that outburst and profusion of insect-life that characterizes woodland life in the States in midsummer. For the benefit of the entomologically curious, I will state that nowhere on the coast, or inland, at least within twenty miles of Salmon Bay, has a grasshopper been seen or heard of! The common red-legged grasshopper, that is so abundant everywhere with us all the summer, which luxuriates on the summit of Mount Washington, and is found by arctic travellers about Melbourne Island, spread, in fact, all through British and Arctic America, is here wanting, so scanty and parsimonious is the distribution of insect-life on these shores. But I must mention the wasp's nest I stumbled upon one day, about as large as one of Heenan's fists, stuck down under the moss, in a mass of roots. Well aware of the notorious temper of these insects, and fully conscious of past sad experiences, I approached the dread precincts, extended a six-foot pole, and gave a gentle tap—no answer; another—two individuals crawl out—a simultaneous rush of the invader to the rear; the "combat deepens"—four more dabs with the six-footer—a baker's dozen issue forth and fly around, alas! how dolorous and sad! They give chase for a pace or two, and then pause, look back irresolutely, and give it up. Such was my experience with Labrador wasps.

By this time we have topped the cliff, and far down below lies Salmon Bay. Seven fishermen from Newburyport find here one of the best harbors on the coast —securely landlocked, and good anchorage in fifteen

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fathoms' mud—a beautiful dredging-ground. Large cockles, curious pelican's-feet, delicate nereids, clumsy crabs, and neat, active shrimp, abound and multiply as the sands of the sea in number. On the right is Salmon Bay settlement, one of the most populous places on the coast, consisting of seven families. And now the eye, sweeping north, east, and west, takes in the vast desolation of hills, relieved only by gleaming fragments of ponds, or snow-banks of a sullen white. There is no continuous series of ranges rising up back of one another, like any well-ordered mountain group, but a chopped sea of undeveloped mountains, whose tops seem to have been ground down by water and ice when the world was much younger than it is now, but which, after this, as if a rebel horde of Titans, made seemingly ineffectual attempts to grow up again, and only succeeded in spots; which, bare then, have been kept bare ever since by arctic frosts and snows.

If we imagine we can see forests growing among those hills, it is only because we have been told that woods do grow in the sheltered valleys, and now and then venture up the hill-sides. Thus the country runs back for hundreds of miles, the hills rising five to eight hundred feet high, bare and desolate, but the valleys are much better wooded in the interior of the country, being warmer and more sheltered. There are no regular rivers in Labrador, only rows of ponds—and very crooked rows—linked by rapids, which the Mountaineers only can navigate in their light canoes. There are no water-sheds, no continuous valleys to unite into one stream the thousand ponds that gather in every depression.

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But we have feasted long enough upon this rare, unique scene. We speak not of the freshness of the breeze, of the exhilaration and inspiration it brings, and not, least of all, of the perfect freedom from every sign of fly or mosquito. Now, as we return, for two miles of bog-trotting, an hour of black-fly and mosquito fighting! While sitting upon the hill during that half-hour's rest the breeze kept the flies from our face; but how secretly and in what untoward numbers had the silvery-legged rascals crept into our flannel shirts, covered hat and back, doing nothing but hold on for the wind! but now, under lee of this wall, the plagues have the advantage. They fly into our face, eyes, nose, and mouth; they do not bite hard, like the mosquitoes, but the vampires suck long and deep, leaving great clots of blood. To complete the work, half a dozen frightful horse-flies of gigantic stature hover about; now and then, when we are not watching, they will settle down on our hands and bite terribly, making a wound which does not heal for days. It is useless to try to bear it. I make a stampede up the rocks to the breeze, but they follow in clouds, pouncing down like small-shot on my wide-awake. So running, as if for my life, one moment, and stopping to rest the next; now starting up a white-headed finch or solitary robin, or stopping to watch a Canadian jay or hungry cormorant sailing aloft, or pausing to trace out two or three contiguous circles of bowlder-stones, which marked the former wigwams of the Esquimaux, who used to have bloody fights on this island with the Mountaineer Indians; now wading a swamp, or making *détours* round miniature ponds, or jumping a narrow ravine, or circumnavigating a growth of tuckermel—I come to a

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stand on the south side of the island. It has been blowing fresh for two or three days from the southwest, and the gulf rolls in a magnificent surf, sweeping grandly upon the pebbly beach or dashing wildly against the sea-wall. Half a mile from shore a huge iceberg is stranded, and the wind blows cold and damp. Farther out on the Strait the sun flashes on four or five other fine bergs, though it is the middle of July. And so clear is the air, that the low blue-limestone coast of Newfoundland, forty miles opposite, can easily be seen.

Now, where are all the sea-birds that I expected to find filling the air, and crowding the rocks, up here in Labrador? A lonely raven is just passing over, a few small land-birds are chipping on the rocks, a small owl wings his noiseless flight low over the bogs—these, with a pair of saddle-back gulls sailing aloft, are about the only birds to be seen. Sometimes a loon flies over the island, or a small flock of eider-ducks settles down in a pool. If one pushes out a little way into the Strait, he will start up a few razor-billed auks, or see a flock of guillemots, or their cousins, the murres. People here call the guillemots sea-pigeons, though more like crows than pigeons in size and color. A flock of puffins will fly off just out of gunshot across the bows of one's boat, for all these sea-birds are shy and difficult to approach. I must delay a moment on these puffins. They are queer, grave birds, profoundly Quakerish in their habit, wise-looking as the seven Gothamites, only wanting a pair of good, old-fashioned, silver-bowed spectacles to set off their enormous hook-nosed visages. Just here they are not very abundant, but fifteen miles up the coast, at Bradore, these peculiar people have appropriated

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MAP OF SOUTHERN LABRADOR.

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a red-sandstone island. On this patch of rock, whose soft, crumbling surface they bore in all directions, making galleries about a foot from the surface, they have bred from time immemorial. However wild they are on the waves, here they suffer themselves to be pulled forth from their holes and summarily choked by ardent ornithologists without a squeak of resistance.

Indeed, June and July, or the first of August, is no time to come to Labrador for birds: all the ducks are among the inland ponds, breeding. The sea-birds that breed here gather in one place sixty miles down the coast, on the Bird Islands, forming the Mecatina group. There are few to molest their nests, and they live in comparative quiet. Let a crew visit a breeding-place in the middle of June, and they can very quickly load a boat with eggs. It is said that vessels come up here from Boston every year, and load up with eggs to carry back to the States.

About the middle of August that beautiful and graceful bird, the sea-swallow, or arctic tern, makes its appearance, flying about the sea-cliffs, hovering over the fishermen's boats, and keeping up an interminable screeching and twittering; they are the most garrulous of gulls. With them appear a few of the rarer gulls. Then the ring-necked and semipalmated plover, and flocks of sandpeeps and yellow-legs gather on the flats. But the curlews eclipse them all. We had had intimations of their arrival. Already had small squadrons been seen wheeling around the hill-tops, and now over the sea, and as they advanced or retreated, their "mild mixing cadence" now grew loud and near, and now waxed fainter and fainter. On the afternoon of the 10th of August I heard the alarm of "Curlew!" and, sure enough, over

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across the neck, a mile away, was a flock of these birds, darkening nearly a square mile of the sky. There must have been many thousands in that flock, all piping and whistling like the jingling of ten thousand sleigh-bells, or the whistling of the wind through the ropes of a squadron of seventy-fours, while performing a series of evolutions of wonderful celerity and precision. The whole mass wheeled around the hills and over the plain, now stretching out over the bay, made up of smaller troops, chasing each other around and through the whole moving mass in the greatest apparent confusion and disorder. It was really a great sight, this marshalling of the curlew hosts. After this grand review of their forces they separate into small flocks, scatter over the country to feed on the curlew-berries now ripening, or to patrol the shore at low-water in search of stray worms and snails. The inhabitants kill large quantities of this delicious bird, and salt them down in barrels for winter use. They cannot conjecture where they come from, but say that the first northeast wind in late summer always brings them.

But the sun is going down in the fog and mist driving in from the gulf. The wind has hauled to the east, and blows chilly and damp; and so ended many of the thirty fair days of the fifty I spent in Southern Labrador.

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CHAPTER VI.

A SUMMER'S CRUISE TO NORTHERN LABRADOR.

I. From Boston to Henley Harbor.

In the spring of 1864, Mr. William Bradford, the well-known marine artist of New York, organized a party to cruise along the coast of Labrador, and if possible to reach Hudson's Strait, for the purpose of painting ice-bergs and arctic scenery. After having previously spent a summer on the southern coast, with no opportunity of extended explorations, it seemed rare good fortune to make one of a party bound for the Moravian settlements, and possibly Cape Chidley.

On the 4th of June, at 10.15 A.M., the fast schooner *Benjamin S. Wright*, Captain Brown; with two pilots, Capt. Ichabod Handy of Fair Haven, Mass., for the northern coast, and Capt. French for the southern shore, a Norwegian mate and two deck hands, with a cook and two cabin boys, carrying a party of fourteen gentlemen comprising lawyers, clergymen, naturalists, sportsmen, and pleasure-seekers, left the Philadelphia Packet Pier, Boston. Owing to an easterly wind a tug towed us down to the Narrows, where we spread our canvas, and beat down to Provincetown for the purpose of buying a whaleboat, making harbor there at 9.30 in the evening.

Spending Sunday at Provincetown, where we visited some friends in the coast-guard, several of whom afterwards distinguished themselves in the war of the Rebel-

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lion, on the 6th, with a fresh northwest wind which so effectually ruffled the ocean that nearly every man settled his account there and then with the sea-god, our course was laid for Cape Sable, which we sighted at about 1 o'clock in the afternoon of the 7th.

The following day we bowled along at the distance of twelve miles from the Nova Scotian coast, the wind blowing a fresh gale from the northwest, and about 2 A.M. of the 8th ran into Chedabucto Bay, anchoring four miles from Port Mulgrave. Weighing anchor the next day and moving up to the town, a mean little fishing-hamlet, while the crew took in wood and water, each one, according to his taste, went either shopping or trouting in the rain, or geologizing. On the following day I walked towards Porcupine Point, a bold headland said to be 275 feet above the Gut of Canso. The view over the Gulf of St. Lawrence is a very pleasant one. The Gut of Canso opens into the Gulf four miles from the Point. The drift material consists of a rich soil containing bits and masses of red sandstone, some of the fragments containing calamites and the impressions of delicate sea-weeds. The rocks *in situ* are a white conglomerate dipping at an angle of 80° and with a N. and S. strike.

The shores of the Gut of Canso are high and bold on the western side, but much lower on the Cape Breton shore. The contours of the hills on the Nova Scotian coast are like those of a granite-gneiss region, the hills terminating in drift "scaurs." On the Cape Breton side the houses are more numerous and the farms either more fertile or cultivated with greater care. At Port Mulgrave the inhabitants did not raise vegetables enough for

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their own consumption; and not infrequently a farmer was seen ploughing with a single ox. Exchange was $1.95. The people were all "sesesh." Although for the disunion of the "States," nothing could separate them from the love of whiskey and gin, as in the course of the afternoon there was a miserable stabbing fray, witnessed by a good many of the inhabitants, though it should be said that there were thirty sail then in the port, from which part of the material for the affray was afforded.

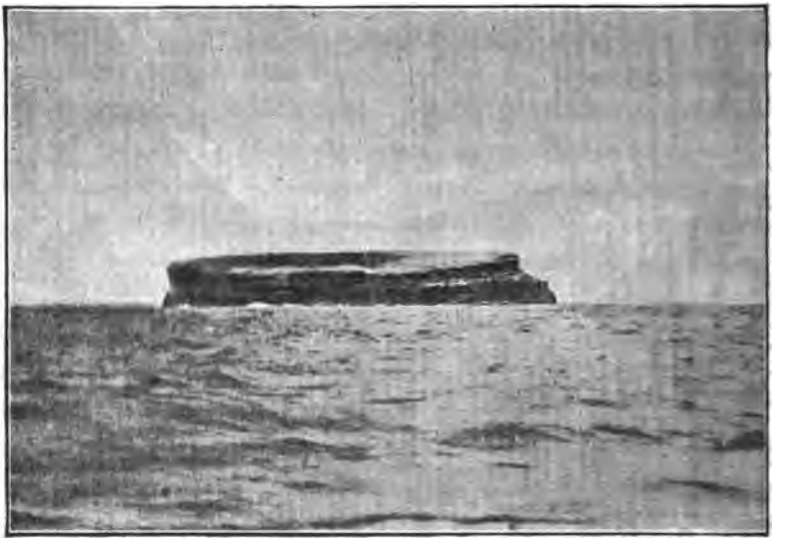
Our fishermen returned with a liberal supply of trout, and Mr. Bradford shipped a steward, who turned out to be an Indian soldier, and had assisted in blowing Sepoys from the cannon's mouth. Whether he was morally and intellectually worse or better than a Sepoy was often a matter of discussion on the cruise.

We were now ready to push out into the Gulf, and the latter was now ready for the reception of the *Benj. S. Wright.* For but a few days ago vessels had been jammed in the ice immediately north of Port Mulgrave, the ice having remained later in the Gulf and been more abundant the past spring than for years. We were told that it was possible for people to walk on the ice a hundred miles out from the Magdalen Islands.

The next day found us off St. George's Bay, the sport of light, baffling winds or of dead calms, but these enabled us to receive lasting impressions of the beautiful green slopes of the Cape Breton shores, with their expanse of green sward framing the square acres of ploughed land centred by red farm-houses. These were our last views of cultivated fields and well-trimmed glebes, until on our return we beheld the rich red farm-lands of Prince Edward's Island.

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Sunday the 12th was a red-letter day, spent about the home of the gannet or solan-goose. At seven o'clock in the morning—and what a glorious one it was: the air soft and balmy, our good vessel's bows gently rising and falling on the swell as if saluting in a measured, dignified way the appearance of the god of day—at this hour Entry Island, one of the Magdalens, was twelve



THE LARGEST OF THE BIRD ROCKS, AS SEEN IN 1864.
(From a Photograph by Black.)

miles off. It is a high mass of red sandstone with abrupt sides and surmounted by two knolls; near it were several small islands, and a high grayish rock deeply incised by narrow valleys plunging suddenly down to the sea.

At noon we approached the Bird Rocks, a group of three islets, the largest 250 feet high and from a

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quarter to half a mile in length, the longest diameter extending east and west. The top is nearly flat and slopes gently towards the south. It is formed, as seen from the south side through a good glass at a distance of half a mile, of red friable sandstone, with thin beds of grit, which near the water's edge are several feet in thickness, while several loose fragments look like bowlders, though there are no true transported rocks on the island.

The islets were nearly white on top, and I supposed this was due to the guano, but Mr. Bradford assured me that the white frosting, as it seemed to be, was the birds themselves; and sure enough, except a central patch of brown and green herbage, the western end was in part, and the eastern half of the island entirely, white with female gannets, resting on the rock above as well as on the larger shelves on the sides, while the small nooks and shelves of grit were appropriated by myriads of murres.

At the report of a gun swarms of birds would rise from the rock and flutter in the air like flies, and at a rough estimate 10,000 were there. To the leeward many gannets, males, were seated in the water or flying over it, in company with a few murres—but nearly all were as if in ceaseless motion, and busy fishing or returning with fish to the avian metropolis.*

* In this connection it is interesting to read the description of the Bird Rock in Cartier's first voyage.

"Wee went southeast about 15 leagues, and came to three Ilands, two of which are as steepe and vpright as any wall, so that it was not possible to climbe them; and betweene them there is a little rocke. These Ilands were as full of birds, as any field or medow is of grasse, which there do make their nestes; and in the greatest of them there was a great and infinite number of those that wee call Margaulx, that are white, and bigger than any geese, which were seuered in one part. In the other were onely Godetz, but toward the shoare

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Mr. Bradford spent a busy day in sketching the unique scene, and his photographer, Mr. Pierce, from Black's studio in Boston, took four good photographs of the rocks and birds. These rocks are the remnants of what were once vastly more extended strata, and the question arose in my mind whether the red soil of Port Mulgrave and vicinity were not the *débris* which had been in part borne from the Magdalen Isles, and in part from Prince Edward's Island.

Since 1864, when the photograph was taken by Mr. Bradford of which the accompanying sketch is a reproduction, great changes have come over the famous gannet rookery of Bird Rocks. Mr. W. Brewster, who, with Prof. Hyatt and others, visited these rocks in 1881, says in his account: "In 1860 the number of gannets breeding on the *top* of Great Bird (then uninhabited) was estimated by Bryant at about 'fifty thousand pairs,' or one hundred thousand birds. In 1872 Maynard found this portion of the colony reduced to about five

there were of those Godetz, and Apponatz. We put into our boats so many of them as we pleased, for in lesse than one houre we might have filled thirtie such boats of them: we named them the Ilands of Margaulx. About five leagues fro the said Ilands on the west, there is another Iland that is about two leagues in length, and so much in breadth: there did we stay all night to take in water and wood. That Iland is enuironed round about with sand and hath a very good road about it, three or foure fadome deep. Those Ilands have the best soile that euer we saw, for that one of their fields is more worth then all the New land. We found it all full of goodly trees, medowes, fields full of wild corne and peason bloomed, as thick, as ranke, and as faire as any can be seene in Britaine so that they seemed to have bene ploughed and sowed. There was also a great store of gooseberies, strawberies, damaske roses, parseley, with other very sweet and pleasant hearbes. About the said Iland are very great beastes as great as oxen, which have two great teeth in their mouths like vnto elephants teeth, and liue also in the sea. We saw one of them sleeping vpon the banke of the water; wee thinking to take it went to it with our boates, but so soone as he heard vs, he cast himselfe into the sea. We saw also beares and wolves; we named it Brions Iland. (Hakluyt, iii. 254.)

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thousand birds (a lighthouse had been erected on the summit of the rock and several men were living there). When we landed in 1881 the top of the rock was practically abandoned, although there were some fifty nests at the northern end, which had been robbed a few days before, and about which the birds still lingered."

Mr. Brewster says, however, that 'the common guillemot (*Lomvia troile*) still breeds at Bird Rocks in amazing numbers, but that the number is rapidly decreasing, owing to the introduction of a cannon which is fired every half-hour during foggy weather. "At each discharge," he says, "the frightened murres fly from the rocks in clouds, nearly every sitting bird taking its egg into the air between its thighs and dropping it after flying a few yards. This was repeatedly observed during our visit, and more than once a perfect shower of eggs fell into the water around our boat."

At 6 o'clock this evening we were 95 miles from Little Mecatina Island, and at 11 o'clock of the next day (the 13th), we sighted land lying under a mirage which looked like the land itself, while the snow-banks ashore were transformed into icebergs floating in the *quasi* sea. This singular mirage lasted until evening. As the land gradually "hove" in sight the mirage receded and the bergs became veritable banks of snow. Little Mecatina was passed at 6 in the evening; its longer diameter was north and south, and the southern end of the glaciated island showed finely the "stoss" side, the "struck" side gradually sloping towards the north. The Labrador coast at this point becomes high and bold, presenting a continuous front to the Gulf, with an occasional "hump" rising perhaps 300 feet or more

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above the general level of the land. The Island of Mecatina is 685 feet above the Gulf, Cape Mecatina being the highest land from Mingan to Bradore.

We dropped anchor in Sleupe harbor in Gore Island, after the quickest voyage Capt. French had ever made. The run from Boston had been a fine one, with northwest winds throughout, and no fog. At sunset the thermometer was 42°, and it grew still cooler as we ran into our harbor, which was on the southern exposure, on which were numerous snow-banks in the deep gulches leading down to the water.

The rocks were red syenite, like those of Mt. Desert, Me., with its characteristic hummocky outline and precipitous walls fronting the sea. No bowlders were seen about the harbor, but the rocky shores were marked and polished by the ice for a few feet above the water's edge.

The murres and saddle-back gulls were now just hatching, while the eider-ducks were beginning to lay their eggs. The curlew-berry was now in flower. In the garden of one of the settlers (Michael Canté), who were French Canadians, the rhubarb or pie plant was just above ground, the parsnips were six inches high, and the grass about the houses was four inches in height, but as yet there was no verdure on the hills, the surface being still sere and rusty, the snow having so recently melted away. The season opens here the middle or last of May, when the snow mostly disappears. The ice left the bay the 20th of May, and about this date the black bear comes out of his winter quarters. It was too early for cod or salmon, and the capelin had not appeared.

Our harbor was between two islands, and on one were two houses, and on the other five, one of them a well-

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built, neat house. About them lounged several Esquimaux dogs. We dredged in ten fathoms on a rocky bottom, not, however, bringing up any novelties, though the animals were all of purely arctic types.

June 14 was spent in egging and in collecting insects. Mr. Bradford secured the services of a Frenchman and his sail-boat, and with several others of the party landed on three islands situated four or five miles away. We found eight nests and twenty-five eggs of the eider-duck, with those of the murre or guillemot and auk, besides three gull's eggs, probably those of the saddle-back. We also found a nest of the red loon: it was situated on the edge of a small pond. The nest, partly submerged, was fourteen inches in diameter and in size and appearance like the gulls' nests, though the latter were placed in dryer localities. The eider-ducks' nests were abundant, as were those of the razor-billed auks, but those of the murres were even less common. The eider-ducks ten years ago were extremely abundant, but the unremitting attacks upon their nests by "eggers" has resulted in the partial extinction of this valuable and interesting bird. All the eiders were busy in making their nests and in laying their eggs. The old or completed nests contained a great mass of down, and were 12 to 15 inches in outside diameter, the downy mass in which the eggs sank being five or six inches high; the newer nests were without down; there were about five eggs to a nest. Most of the nests which we saw were built on low land, near pools and not far from the sea-water, in a dense thicket of dwarf spruce trees, called "tucking-bush" or "tuckermel." The murres and auks, as is well known, do not make nests, but drop their eggs

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under projecting rocks, or on overhanging shelves on high cliffs, or under blocks of granite. I found one murre's egg which had been laid on the ice under a huge rock, and as I worked my way under the rock to get at the single egg, the stupid bird did not fly, but simply moved a few steps beyond my reach, making an odd guttural noise. It need scarcely be added that the vicinity of a murre's or auk's nest is filthy in the extreme. The egg-shell of these nestless birds is very thick, so that they may roll about or drop down without breaking; how they came to be so much more conical or pointed at one end than usual is an interesting question.* We also saw a king eider flying with a small flock of eiders, as well as several "shags" and a northern phalerope.

Insect-life was now stirring; the pools abounded in water boatmen (*Corixa*), and whirligig beetles (*Gyrinus*), while a species of feathered gnat (*Corethra*) was just leaving the pupa, the cast skins of the latter floating on the surface of the pools. A lonely humble-bee was flying fussily about, a syrphus-fly was hovering over the flowers of the cloud-berry, and other insects were found under stones, amongst the moss, or in the water. The appearance of insect-life corresponded to that of south-

* "There was one bird in particular which we watched for some time, the proud possessor of a brilliant green, strongly marked egg—as usual, to all appearance quite out of proportion to her own size—which she arranged and rearranged under her, trying with beak and wing to tuck the sharp end between her legs, but never quite satisfied that it was covered as it should be. *But for the wonderful provision for its safety in the shape of the guillemot's egg (a round, flat-sided wedge, which makes it, when pushed, turn round on the point instead of rolling*, as eggs of the usual form if placed on a bare rock would do), most of those we saw would probably have been dashed to pieces long before." (T. Digby Pigott's Birds of the Outer Faroes, 1888.)

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ern Maine at the end of April. The next day a white-faced wasp (*Vespa maculata*) flew aboard the vessel. The day was spent in searching for eider nests, of which I found a dozen in the "tucking-bush," with thirty eggs, and the rude nests and eggs of the saddle-back gull.

June 16th was a beautiful day, rather warm, with light winds from the east and south, or quite calm. In the afternoon a shower passed over from the west, and at night the wind was northerly; the southwest summer winds had not yet set in, the prevailing winds being northerly. We spent the day in a search for the eggs of the "waupigan" or common cormorant, and those of the shag or double-crested cormorant; William, a very intelligent French Canadian, taking us to their nesting-place in his row-boat. The nests were situated on a high cliff, a sort of shelf. We let William down over the precipice with a rope. There were fifty-five nests in all, and over them rose flocks of cormorants disturbed at our coming; they were very shy and flew rapidly far off, wheeling about in circles, but not daring to come near the nesting-place. There were five eggs in a nest; the latter were about 20 inches in outside diameter, built of thick birch limbs, whitened, as was the rocky shelf, with the excrement of the birds, and the entire neighborhood was pervaded with a far-reaching and intolerable stench of decaying fish. The eggs of the common cormorant are said to be laid earlier in the season than those of any other bird; they are long, pointed, and of a dirty tea-color, some nearly white. The shags' nests, mixed with those of the waupigan, were situated in another place adjoining. They are usually laid on the bare rock, and William was surprised to find them on the precipice. The eggs are

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smaller than those of the common cormorant, are whiter and more pointed, and are laid later than those of any other bird.

On our return we went by invitation into William's house; his children were attractive in looks, with fine eyes. This family and a neighboring one were the two leading French Canadian families on the coast. They told us that it was harder to gain a livelihood than heretofore, the game and fish getting scarcer. Still, one family winter before last shot 1100 partridges. William, by the way, told us that there were four varieties of partridge: the spruce partridge, and the white or ptarmigan, of which they distinguish the mountain ptarmigan and the river ptarmigan, the latter the rarest; the fourth kind they call the pheasant. The partridges were said to be now laying their eggs. William raised last year twenty-five bushels of potatoes, also turnips, while barley, having three months to grow, ripens on this inhospitable coast. Sheep might be raised; there were no cows, though to the westward they are kept the year through. We were told that a walrus was killed near St. Augustine within twenty-five years, and that two had been seen in this vicinity since then. It will be remembered that the walrus formerly abounded in the Gulf of St. Lawrence, having been rendered extinct by the early fishermen on the Magdalen Islands.

We saw an egging vessel at a distance. The "eggers" watch their chances to take great quantities of eggs of sea-birds, especially those of the eider-duck and murres. But there are now few who follow this illegal and nefarious occupation. Twenty years ago the business was at its height, and a schooner would load a cargo

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of 65 barrels of eggs and take them to the States or up the St. Lawrence River to Quebec or Montreal. Of late years they would give half of what they found to the settlers on the coast as hush-money. When collecting the eggs they would make "caches" of them, covering the heaps with moss; and if they were on the point of being caught they would smash the whole cargo of eggs rather than be seized with them. Many are the adventures which the eggers have passed through, and the stories told of them rival the tales of smugglers and privateersmen on more favored shores. They still collect and wantonly destroy the eggs of murres.

The eggs of the eider-ducks we found to make a good omelet, but those of the murres and gulls were too fishy to be palatable; the food of the murres and puffin as well as gulls consisting largely of small fish, such as capelin and lance fish (*Ammodytes*). We saw male eiders two years old; they were brown with a little white; we were told that the eider is four years in arriving at maturity; the guillemot only two years; the puffins and murres becoming adult in one year. The eider-duck is easily domesticated, and the young will follow a person to whom they are accustomed like a dog.

As soon as our vessel came into shallow water,—and in our boat excursions we were constantly impressed by the transparency of the water on this coast—we could look down for thirty or forty feet and see with distinctness the bottom with dark masses of sea-urchins and starfish. The water is more transparent than on the Florida coast. Indeed the fishermen sometimes complain of this property of the water, saying that the fish can see the nets too readily and do not enter them. The water is so clear

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that the Ctenophores, *Idyia roseola* and *Pleurobrachia*, as well as another kind I could not secure, were beautifully distinct far down in the pellucid depths. Fishing had begun at this locality to-day, the cod having struck in. It is evident that the ice having disappeared for nearly a month the water inshore undoubtedly had grown warm enough to allow the cod and other fish to come into shoal-water and spawn. It was manifest that as the season opened later and later from south to north, the movement inshore would be later and later from south to north, and this fact has undoubtedly given rise to the popular impression that the cod and other fish migrated from the southern to the northern portions of the coast of our continent.

I anxiously questioned William as to the nature of the interior of Labrador. He told me that there were plains and terraces inland; that there were toads and frogs and "lizards," which being interpreted undoubtedly means the salamander, most probably *Plethodon glutinosus* of Baird. He had been here twenty years before he saw a grasshopper, but this was not on the coast, but in the interior; and I know scarcely a better criterion of an arctic land-fauna than the entire absence of grasshoppers on the Labrador coast, since none occur in the circumpolar regions, either treeless Arctic America, Greenland or Spitzbergen; but the interior wooded portion of the Labrador peninsula supports a truly boreal or "Canadian" insect fauna, with grasshoppers.

Among the insects found were the showy caterpillars of *Arctia caja* and a weevil. Of the more noticeable flowers, there were a pink Arenaria, and a leek-like plant which I have often seen on the summit of Mt. Washington.

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The 17th we weighed anchor, and with light winds and some rain early in the morning, but a strong north-easterly head-wind in the forenoon, we made only twenty-five miles during the day. The coast along our course was of very even height, the monotonous outline being relieved by an occasional elevation. The rock was of syenite with its characteristic scenic features. It was of warm, reddish flesh tints, but full of chinks and cracks, made by the water percolating or running into them and freezing, resulting in the cracking and disruption of large rock masses. Then the continued action of the frost year after year widens the chinks into gulches, with even, precipitous sides, now filled with snow-banks ten or fifteen feet long, and sometimes a dozen or more rods in extent, their edges bordered with arctic flowers. The hills were barren on top, with moss and dwarf spruce in the cavities or ravines. Here and there were to be seen clumps of grass, but the herbage in a Labrador foreground is not grasses or sedges, but low shrubby woody plants such as the dwarf cranberry, the curlew-berry (*Empetrum nigrum*), etc., which form a dense uniform carpet of varied but dull green hues.

On the afternoon of the 18th we dropped anchor near Caribou Island, and on landing found Mr. Carpenter, the missionary of these shores, who had befriended us in so many ways while camping on this island in the summer of 1860. He was well and prospering in his good work. I lost no time in borrowing a spade and digging for quaternary fossils, and was rewarded with the discovery of several species not detected in 1860; among these were *Serripes groenlandicus*, *Buccinum undatum*, etc.

On the evening before June 20, the longest day of the

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year, I could read fine print until half-past eleven at night. The next morning I dredged in eight fathoms before weighing anchor, and was delighted to find several large specimens of a delicate bivalve shell (*Pandorina arenosa*); it was afterwards dredged up the coast at Long Island in fifteen fathoms in sand and stony bottom. It had not before been found south of the polar seas; its discovery so far south was interesting from the fact that we had found it in a fossil state in sandy strata of clay at Brunswick, Me., and had also been found in the quaternary clays at Saco, Me., by Mr. C. B. Fuller. The association of this shell with *Nucula expansa* (antiqua) in the brick-yard clays gives positive proof that during the wane of the ice period the shore of Maine was the home of a truly polar assemblage of marine animals, and that then as now on this coast these shells were not confined to deep water, but lived in shallow retired bays in water not over fifty feet in depth.

Throughout the day we were in sight of the butte-like Bradore Hills, the highest of the three mountains being 1264 feet above the level of the Gulf. As these mountains overlook the scene of Jacques Cartier's explorations in the Straits of Belle Isle, we would suggest that the highest of the three elevations be named Mt. Cartier.

On the shores of Bradore Bay are still to be seen, it is said, the ruins of the ancient port of Brest, which was founded by the Bretons and Normans about the year 1500. The ruins are situated about three miles west of the present boundary of Canada at Blanc Sablon. Samuel Roberton states in his Notes on the Coast of Labrador: "As to the truth of Louis Robert's remarks there can be no doubt, as may be seen from the ruins and

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terraces of the buildings, which were chiefly constructed of wood. I estimate that at one time it contained 200 houses, besides stores, etc., and perhaps 1000 inhabitants in the winter, which would be trebled during the summer. Brest was at the height of its prosperity about the year 1600, and about thirty years later the whole tribe



THE BRADORE HILLS, THE HIGHEST PEAK MT. CARTIER.

of the Eskimos, who had given the French so much trouble, were totally extirpated or expelled from that region. After this the town began to decay, and towards the close of the century the name was changed to Bradore."

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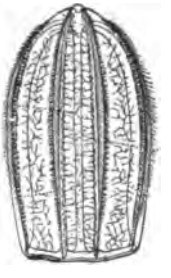
By sundown our vessel had made only ten miles, being off Belles Amours, with a southerly and very light breeze. The sunset was a glorious one, while the moon rose through the haze and mirage over the snow-banks of the Newfoundland coast. At three in the afternoon we saw several miles ahead of us the fields of ice which we were soon to encounter, choking up the straits, and enhanced in apparent extent by the mirage. The Labrador coast, along which we were sailing, is very bold and bluff-like, with lower points of land reaching out to us in a picturesque way, the remarkably even outline of the coast being interrupted by the Bradore Hills.

The dredge was put down about two miles from shore in from ten to fifteen fathoms on a hard, stony bottom, with good success. Beautiful specimens of *Lucernaria quadricornis*, four inches in height and of a dull amber brown, came up in the same dredge with that superb naked mollusc, *Dendronotus arborescens*, which were of a beautiful amber hue, dotted with white points. From the stomachs of fishes caught by some of the party were extracted specimens of a rare arctic crab (*Chionœcetes opilio*), which proved to be not uncommon in from ten to fifty fathoms in the Straits of Belle Isle.

The next day, from nine in the morning until three in the afternoon, we moved slowly through the floe-ice, which proved to be the outskirts of the immense fields of ice which this summer lined the northern coast of Labrador. Mr. Bradford kept his photographer busily at work taking views of the more remarkable forms. The splendid green hues, so varied and striking; the endless variety in the water-worn forms; the weird noises, now harsh and grating, now loud and roaring, produced by the

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attrition of the cakes of ice ground together by the slight swell or the conflicting currents, lent unending interest to the scene. The floes had evidently the air of tired and worn travellers; they had been borne for at least a thousand miles from Baffin's Bay; had been thrown upon one another by storms and ocean currents, broken and frozen together over and over again; they were now rapidly melting away in the bright, warm sun, for the water was filled with bits of clear dark ice, the fragments of large floes. Our vessel, her sails scarcely filled out by the light baffling breeze, rose and fell, ploughing her way through the yielding floes. The water between the cakes was alive with bits of animated ice, myriads of transparent Ctenophores crowding the sea from the surface to a depth of a fathom or more. The roseate *Idyia*, throwing off the most delicate reddish tints, seemed besides to reflect the delicate blues and greens cast off by the floes; an Alcinoe-like form, floating on its side, with blood-red tentacles, rose and sank among the ice-cakes, and with these in lesser numbers was associated that beautiful spherical living ball of ice, the Beroe or *Pleurobrachia rhododactyla*. The Alcinoe-like form was the *Mertensia ovum*, a creature as fragile as it is beautiful. It is of a delicate pink color, with iridescent hues; the ovaries bright red, the deep purple-red tentacles in striking contrast with the delicate tints of the body itself. From this point until we reached Hopedale in lat. 55° 30′ it constantly occurred in the floe-ice, but was rarely seen in waters from which the ice had disappeared, as in harbors free from ice the Mertensia would keep out of



Idyia roseola, natural size.

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view near the bottom ; but as soon as the ice drifted in and choked up any harbor we were in, myriads could be seen near the surface, rising and falling between the ice-cakes, gracefully throwing out their tentacles, which were nearly two feet in length, and suddenly withdrawing them when disturbed. No true jelly-fish were to be seen ; the season was early for them, but the beautiful polar shell-less snail, the *Clione limacina*, with its long wings and bright red tints, was not uncommon.

Stopped by the ice early the next morning we came to anchor at Belles Amours, waiting for a change of wind to allow a passage past or through the floe-ice. The coast is high, abrupt, and precipitous. Numerous streams well stocked with trout tumble into the sea, and the drift deposits, of limited extent, consisted of coarse gravels and bowlders of syenite.

We looked for insects, finding nothing of particular interest, though noticing that the ants had just come out of their winter quarters. Glad enough were we to find a snail (*Hyalina electrina*), and in the mud at the bottom of the ponds a little bivalve shell (*Pisidium*) ; under stones in the brooks were larval stones-flies and Ephemeræ ; while a little salamander (*Plethodon glutinosus*) of a slate color with a paler light dorsal band ran into the water, to my great disappointment just eluding my grasp, as it is doubtful if any salamander occurs much farther north on the coast than this species.

Here the alders were still in blossom, showing that the season had just opened, though the shadberry, the golden thread (*Coptis*) and the bunch-berry (*Cornus canadensis*) were likewise in bloom ; on the other hand the mountain-ash was just unfolding its buds.

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Dredgings carried on in so shallow water as four and six fathoms revealed pelicans' feet (*aporrhais*) in abundance and very fine large *Serripes groenlandica*, and with them in the mud and sand a great abundance of nemertean and other worms, and Amphipod Crustacea, with fine examples of *Cuma bispinosa*.

The principal house-owner at this fishing-station was a Mr. Buckle, who had been out here for twelve years from Boston. To his comfortable house was attached a conservatory and garden. Though the scanty soil on this barren point looked unpromising enough, it was comparatively rich. He had built his own schooner, a vessel of thirty tons.

On the beach was the skull of a "killer"; it had recently been brought ashore and was surrounded by a number of hungry whelks (*Buccinum undatum*) which were cleaning off the flesh from the bones. The killer is the most voracious of the smaller cetaceans, and is the bulldog among the whales. The head is very blunt, the skull thick, the jaws powerful, the teeth longer than those of the grampus. It is at once known when swimming in the water by its high, narrow, pointed dorsal fin, which projects five or six feet out of water. It attacks with great boldness and pertinacity the right and finback whales, gouging out from their lips and side lumps of flesh, and, as Captain Handy told me, is especially fond of the whale's tongue.

The next day we walked inland, following up the stream which empties into the Gulf at Belles Amours. We, however, took the wrong side of the brook and failed to see the cascade where the stream, as we were told, falls down over a precipice forty feet high; but from a

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hill perhaps five hundred feet high, which overlooked the country, we could trace the course of the brook for about two miles, where it ran down a steep ravine, with ponds on either side, from which flowed streams sending thin and broken sheets of water over steep precipices. The lake from which the stream issued was perhaps a mile long, situated on high land, and a foaming stream poured into it from the northwest, while farther on in another depression was probably a second lake like the one in view. Such is an ordinary Labrador stream—a chain of ponds connected by rapids or waterfalls. There was a dreary sameness to the surface of the country, relieved, however, by a few snow-banks. During our ramble we heard the familiar liquid notes of the wood thrush, and saw some coots flying over the pond. In the afternoon the wind hauled into the eastward and was followed by rain.

The 24th was misty and drizzly ; the wind east veering to the northeast. We dredged all the afternoon, part of the time scraping a coralline bottom. An arctic sea-cucumber (*Pentacta calcigera*) was common in five fathoms in mud, with the largest Serripes yet met with. The most interesting form brought up was a beautiful hydroid (*Coryne mirabilis*) growing on the red sea-weed (*Ptilota elegans*). It was anchored by its stalk, with bell-shaped medusæ attached, which were provided with four pink eyes and short, thick, knotted tentacles, the pendant proboscis being very long, club-shaped and of a pinkish hue.

While lying at anchor a few boat's lengths from shore we were visited by two or three weasels, which must have swum off to the vessel. They were exceedingly

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tame, approaching within a foot of my finger even when it was kept in motion.

On one side of our harbor was, as at Caribou Island, a sandy beach where the fishermen could haul their nets for lance. The Newfoundlanders would come here in their clumsy boats from a distance of eight miles, where their vessels were at anchor, and seine for lance fish. They made a great deal of noise about it, though there were only two boats; one man would stand up in the stern paying out the net, while the full boat's crew would row rapidly around the fish, and another man standing up to his waist in the water hauled in the net; in this way four barrels of fish are often caught at a single haul.

Mr. Phoenix, one of our party, here caught a young salmon eight inches long. The next day (the 25th) saw us still weather-bound with thick fog and rain, clearing up towards the evening. In codfish caught at a depth of fifteen or twenty fathoms we found large fine specimens of the lobworm (*Arenicola piscatorum*) and a fine polar shrimp (*Crangon boreas*). To-day I found the first *Cyanea* or nettling jelly-fish, the species which grows on the banks of Newfoundland by the end of summer, two feet in diameter, with long, trailing tentacles sometimes six fathoms in length; it is these feelers, filled with microscopic darts or lasso-cells, which become entangled with the lines and poison the hands of the fishermen. As yet not a common jelly-fish, the *Aurelia aurita*, had been seen.

The next day we were released from our prison; a fresh northwest wind cleared the ice from the shore, and our good ship made a fine run to Henley Harbor; time from 6 A.M. to 3.30 P.M. As we sailed out of the harbor

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we could see that the low point running out into the Gulf from the Laurentian background of syenite was the western extremity of the basin of Cambrian red sandstones and grits which extend between Belles Amours and Anse-au-Sablon. Skirting the coast within a mile or two of these interesting series of rocks, they are seen to rise to a height of five or six hundred feet, forming the coast line, but with a contour tame and monotonous compared with the syenitic hills of Bradore. The belt is a narrow one, and while sailing past the shore we could look up through the harbors and bays to the low conical hills of Laurentian gneiss in the interior. Passing by Bradore Bay the lofty buttes of Bradore are seen to rise up from the low foreground of red sandstone. We then passed within sight of Greenly Island, where in 1856, during a severe southwest gale, so sudden and common in the strait, thirty-one vessels for want of good anchorage and shelter were driven upon a lee shore. Parrakeet Island then hove in sight, a favorite breeding-place for the parrakeet or puffin, with a single house on it, the hospitable mansion of a member of the ubiquitous Jones family, where in 1860 a party from our camp on Caribou Island received board and lodging for which only thanks would be accepted.

We then sight Blanc Sablon. The land here is high and descends to the sea in five very distinct terraces, of which the second is much the highest. There were huge bowlders of grit on the beach; the raised beaches were packed with bowlders and the terraces in general direction appeared in perspective, as if dipping up the strait; like river-terraces they were parallel to each other, but the lower one gradually dips down and loses

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itself in the water, while another slopes in the opposite direction. The higher terraces appear as if wooded or green. There were indeed three shades of green : in the lower terrace the debris is covered with a pale green herbage ; the older vegetation is darker, while the upper rusty green tint is very dark.

At Blanc Sablon, which was originally so named by Jacques Cartier, the settlement consists of twenty houses ; they were painted white and from the vessel appeared like masses of floe-ice stranded on the shore. Of the houses four are "rooms," or fishing-establishments.

We then pass the fishing-settlement of Forteau, with a lighthouse on the point, besides about twenty houses, and a Catholic church. Off the lighthouse is Shallop Island ; the harbor is two or three miles deep, walled in by vertical cliffs, furrowed and streaked by rain and frost. Into the harbor empties a salmon stream ; one man here seems to have the monopoly of the salmon fishery, putting up from twenty to sixty barrels a year ; they are salted and sent to Europe.

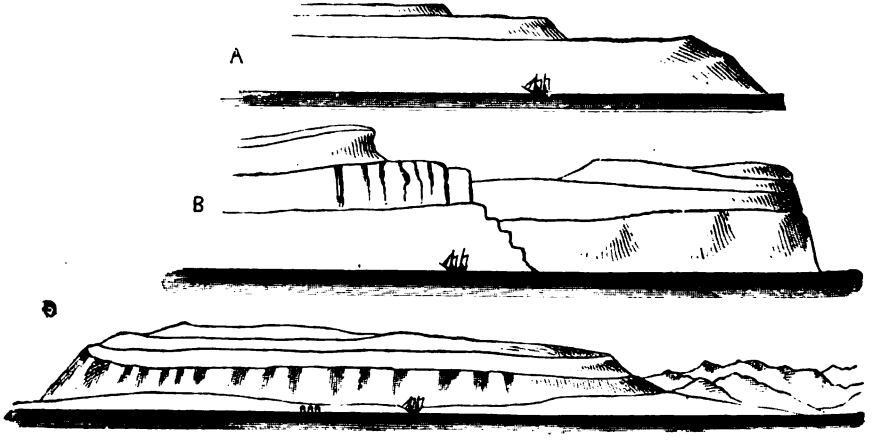
Now as we pass on, the bay opens and at its head we can see the Laurentian formation, with its low, obtusely pointed gneiss hills ; but the general surface of the Labrador coast is very uniform, while the opposite shores of Newfoundland now recede and appear to be much lower. The strait is about eleven miles wide in its narrowest part.

Sailing on but half a mile off shore at Anse-au-Loup, we can plainly see that the Cambrian rocks are red and gray sandstones—that the strata, almost horizontal, dip a little to the west, descending to the strait by three

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rock-terraces or shelves. A large brook here plunges in a broad sheet of foam straight down into the sea. The east side of the harbor of Anse-au-Loup is much higher than the western, the surface is irregular, and the buttressed steeps recall the Palisades of the Hudson. Then we pass along a beautiful green glacis, and on the northwest face of the bluff are five terraces, with the sandstone strata slightly inclined. Here on the lowest bluff are to be seen four terraces (Fig. *B*).

In the bay east of Anse-au-Loup, whose shores seemed



A, TERRACES AT BLANC SABLON; *B*, AT ANSE-AU-LOUP; *C*, TERRACES SEEN FROM THE MOUTH OF A BAY EAST OF ANSE-AU-LOUP.

to be well wooded, we can again look through to the original broken Laurentian rock, and the Cambrian sandstone (Fig. *C*) runs out into a low point terminating in a low, shelving, green glacis. On this point is the fishing-hamlet of Semedit (a corruption of Saint Modeste), with but two houses.

The wind freshened off the cliffs, and now sailing on,

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the rough and fissured syenitic coast is in marked contrast to the Cambrian shores we had just left. Going farther on we pass from syenitic to gneiss rocks, which rise from the water in long swells.

Belle Isle, the Isle of Demons of the early navigators, now heaves in sight; the Labrador coast is more subdued, the shores sloping to the water's edge. There are no islands along the coast, and within five miles of Henley Harbor the rock becomes entirely gneiss in character, and we lose sight of the rough, hummocky syenitic hills, though masses of flesh-red syenite are seen resting upon the dark gneiss rocks, forming a sea-wall.

Now that notable landmark, the Devil's Dining Table, appears to view, and we soon distinguish Henley and Castle Islands, the two latter like two flat oblong blocks laid by Cyclopean hands on a foundation of rock.

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CHAPTER VII.

A SUMMER'S CRUISE TO NORTHERN LABRADOR.

II. HENLEY HARBOR TO CAPE ST. MICHAEL.

As we entered Henley Harbor the scene was unique. The strait was clear of ice, though a few days earlier the harbor had been packed with it, and remnants were stranded along the shore or carried hither and thither with the tides. The outlines of some of the pieces were beautiful; many were painted with green tints while the sun was high, but later in the afternoon the greens were succeeded by bright azure blues, contrasting with the almost cobalt blues of the distant Laurentian hills. The entrance to Henley Harbor is very fine, the sea-cliffs being over 200 feet high, while behind are the peculiar outlines of the Laurentian gneiss, rising in long swells like whales' backs to a height of perhaps five or six hundred feet. Henley Harbor lies under the lofty, precipitous basaltic cliffs of the Devil's Dining Table, which caps Henley Island. We sail through a fleet of Newfoundland fishermen, whose low, thick masts, strong, clumsy rigging, and ironed and planked hulks—for they were sealers, and had not stopped to doff their ice-armor—contrasted with the beautiful model, slender, tapering masts and spars of our fleeter craft. Their decks were crowded with men, women, and children, dogs and goats, for these people had, like the old Norsemen, brought their families and stock with them for a sum-

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mer's stay on the coast. Ashore, under the dark, beetling crag, lay the fishing-hamlet of Henley Harbor. The houses were small and mean, the flat roof of some covered with turf, the grass or moss growing on them, while the fish-houses and "stages" were of the meanest description.

After coming to anchor we were boarded by the captain of one of the sealers, a brigantine of perhaps 140 tons burden, lately in from Carbonear in Conception Bay. Her bows and also her sides were planked and heavily ironed to resist the ice in the spring sealing in the Gulf. The captain had, immediately after discharging his cargo of sealskins and blubber—and the smells rising up through the hold and companion-way proved the fact *ad nauseam*—only delayed long enough in port to put in 130 bushels of salt, and then cleared for the Labrador coast without stopping to strip off the outer planking. The captain was an intelligent, stalwart, English-born man only twenty years old, who had been to sea for six years. He was frank and communicative, and in half an hour gave us some insight into the mysteries of fishing and sealing. He had inherited the business, his father having been a sealer for fifty years. He owned the vessel and had brought along a cook; he took, passage free, eleven families, numbering 130 souls, men, women, and children, with goats, dogs, cats, and provisions for the whole party, and was to land them at some harbor on the coast north of the Strait, where they might spend the fishing season in their rude summer houses, called "tilts."

During the voyage up the women are stowed aft and in the hold, and in a storm—and when are there two

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continuously pleasant days on this coast?—the hatches are battened down, the food is handed to them through a hole in the cabin, and then they are left to take care of themselves as best they can until the storm clears off, when the hatches are removed, and the forlorn passengers can take a breath of fresh air.

The captain does not take an active part in the fishing, but makes his profits by charging for freight on the fish. If the season is a good one and his vessel is soon filled, he goes back to Newfoundland and charters more vessels to carry back all the fish which have been caught. The season lasts from the end of June until about the 20th of October.

The season for the seal fishery during the past spring was from March 25th until June 4th. The Gulf, of course, was filled with ice, no water being in sight from shore. A successful "catch" of seals is "better than 9000." Each vessel carries fourteen boats, which are piled up on deck; four men man a boat; each man is provided with a gaff or boat-hook and a piece of ratline three and one-half fathoms long. On coming up to where the seals are lying, the crew land on the ice. The sealer runs up to a seal lying near its hole, which may be only a rod or so from the vessel or boat, clubs it—and it is easily stunned and killed with one or two blows—sculps it, then peals off the skin and blubber, leaving the carcass on the ice-floe. Each man can tie up five sealskins, and drag them to the vessel, and sally out again, rushing ahead and racing with the other crews of "bloodhounds." The scene is one of excitement and peril, the ice constantly endangering the vessel, which is liable to be "nipped" and to founder, leaving the ship-

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wrecked sealers to burn their vessel and make their way ashore over the ice. One of Mr. Bradford's most successful paintings represents a sealer "nipped" by the ice, the crew abandoning her after having set fire to their vessel, and walking with mournful steps over the ice in the direction of land. The delicate blues of the ice, the sullen, neutral tints of the sky, the red glare of the flames breaking out of the burning ship, and the warm tints of the costumes of the men in the foreground, vividly portray a most tragic scene, enacted only too often on the Gulf of St. Lawrence..

To return to our statistics: a "crew" of sealers on the ice is composed of fifty men; each one, if successful, securing five seals. Two hundred and fifty pelts may be brought back after each sally from the vessel. In this way, when the seals are abundant, from 2500 to 3000 sealskins are taken in a single day; 9000 making a cargo. The shares in the enterprise are £60 each man. The captain takes half, "leaving the men in the lurch," as our informant said, which being interpreted means that the men realize little or no profits from the voyage.

A sealskin is worth $4.00, a full cargo, perhaps, selling in the rough to traders for $30,000 or $40,000; the profits on a full cargo are therefore considerable, but the men's "half," being distributed among a large number, does not amount to much for each man. This spring (1864) the seal fishery was a failure.

The young seals are killed by knocking them on the head with a boat-hook or club, and the old ones by shooting them with heavily loaded old muskets. The hunters make holes in the ice and then watch for their heads to appear above water. Of all the different kinds

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of seals, the Greenland or harp seal is the most ferocious.

The summer at Henley Harbor was a very backward one; the salmon had not yet appeared at the mouths of the bays and rivers; nor had the cod and their natural food, the capelin, moved in from the deep water. The enormous extent of floe-ice which skirted the coast had lowered the temperature of the sea; at the same time the ice-fields had prevented any icebergs from entering the Strait. The prevailing winds were cold and easterly; the cold climate, the strong tides and the three-knot Labrador current passing around the cape into and down the Strait of Belle Isle render navigation here uncertain and dangerous.

June 27. The light southeasterly wind brought into the Strait the fog which had lain all the day previous outside of our harbor, and inland the clouds rested on the hills; the day being dark and lowery. In the morning some of us rowed three miles up to the head of Pitt's Arm, in Temple Bay, a deep fjord penetrating the high gneiss hills, into which pours, over a stony channel, a rapid trout stream about five yards across. The sandy beach was an ancient sea-bottom containing deep-sea shells.* On each side of the mouth of the brook were two terraces; on the upper terrace, which was about forty feet above the sea, were two winter houses. I particularly observed the appearance of these houses. One was 21×15 feet in size, the walls of upright, thick boards, the frame of poles; the flat roof was constructed of poles

* The shells were *Buccinum undatum*, a variety with two ribs on the whorls; *Saxicava rugosa*, *Mya uddevallensis*, *Macoma proxima*, *Serripes groenlandica*, *Natica clausa*, of large size, and a branching polyzoon, *Celleporaria surcularis*.

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placed near together and covered with birch and hemlock bark, the strips, which were a foot wide, being placed crosswise; the eaves were scarcely five feet above the ground, and the floor was in part of boards and in part of turf. The door, hung on iron hinges, and closed with a wooden latch and string, was only four and a half feet high, and there was a single window, 16×15 inches. Within were three beds and a settle. The lumber for these shanties had evidently, by the piles of sawdust near by, been sawn upon the spot and taken from the Labradorian forest of firs near at hand, which measured twelve inches through at the butt, and were about twenty feet high. In their branches a robin and a sparrow were flitting about. The willow bushes were here five feet in height. On the sides of the sandy terraces were blackberry and raspberry bushes, and currants, shadberries, and golden thread just in blossom, while the alders were still in flower.

I dredged in water about fifty fathoms deep, in Château Bay, bringing up, among molluscs, fine large *Leda pernula*, *Astarte banksii*, *Lyonsia arenosa*, *Cardium islandicum*; rare sandstars, and young and old arctic crabs (*Chionœcetes opilio*).

The 28th was almost wintry in its cold, changeable weather. A northeast storm raged, with a few drops of rain and a little snow in the forenoon, while after dinner there was a thick snow-storm, the hill-tops being whitened with snow for several hours, which, however, disappeared by the evening. The water in the harbor was intensely cold, and the Mertensia and Clione, those beautiful creatures of the icy seas, abounded.

The forenoon was spent in examining the trap rocks

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on the harbor side of Henley Island, and in shore-collecting. The rock-weeds or fuci do not grow luxuriantly on the coast of Labrador, but are stunted and dwarfed, like their more highly-born relatives of the vegetable kingdom ashore. Below tide-mark, however, though the tide on the Labrador coast rises and falls only two or three feet, the Devil's Apron or Laminaria is seen, but not so common and large as on the coast of Maine. Life between tide-marks is scanty compared with the New England coast. We never detected the common whelk that gives the purple dye (*Purpura lapillus*); but the two Littorinas (*L. rudis*, less commonly *L. littoralis*) were common; these are circumpolar forms, abounding at the water's edge at Greenland.

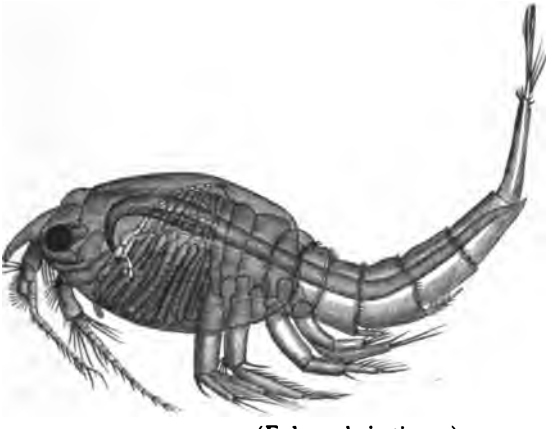
In this region scarcely a sea-bird was to be seen, and rarely even a gull; but on one occasion three ducks, while a lonely raven flew about the cliff. Insect life was scanty, and with the animals and plants showed in its appearance a strange intermixture of what at home would have been characteristic of early April and late May. Frogs are seen here, we were told: in the garden the turnips were just up.

Thirty years ago there was but a single house at Henley Harbor, and none at Red Bay, where now there are thirty. The fish and birds here, meanwhile, have vastly decreased in numbers. The fish are principally cod, salmon, and herring. Old Captain French, our pilot, never saw a hake on the Labrador coast, and only two haddock, though both kinds are abundant and troublesome to cod fishermen at Bay Chaleur, on the New Brunswick shore.

Detained another day by head-winds and rain in the

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early part of the day, the wind in the evening hauled around to the S. W., giving us a fine evening sky. I dredged in the morning in the rain over the side of the vessel in four fathoms, the bottom rich in the red sea-weed (*Ptilota*), the Desmarestia, and the sea-colander (*Agarum turneri*), and besides a portly queer-spined amphipod (*Amphithonotus cataphractus*), which carried its brood of young, also bristling with spines, a fine large *Crangon boreas* with other bright red shrimps came up.



NEBALIA BIPES. (Enlarged six times.)

In the afternoon we sailed out two or three miles to the mouth of the harbor, and dredged in from ten to twenty fathoms on a hard, pebbly bottom, evidently the continuation of the beach, and showing that the land was formerly at least from one hundred to three hundred feet higher than at present; besides *Lyonsia arenosa*, *Kennerlia glacialis*, and other shells and crustaceans, the interesting *Nebalia bipes* was taken: it was also found in as shallow water as four fathoms. This form is less than half an inch in length and is found throughout the Arctic Ocean, is common on the coast of Norway, and its family is now

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regarded as the sole existing type of a distinct order (*Phyllocarida*), whose gigantic fossil prototypes, some of them nearly two feet in length, occur in the palæozoic rocks in America and Europe.

The next day also we were wind-bound, but the gale was from the southwest; the wind blew very fresh, having a good sweep over the Gulf, the breakers ran high, as nearly all the harbors in Southern Labrador, *i.e.*, south and west of Belle Isle, are exposed to gales from this direction. We put out our kedge anchor, and frequently had to haul in a part of the cable to keep the vessel off the rocks. We should have put out to sea and taken advantage of the gale to go on our course up the coast, but were afraid of running upon a sunken rock at the mouth of the "tickle" or narrow passage forming our harbor.

A part of the day was spent about and upon the Devil's Dining Table. This is a mass of columnar basalt, which has been described by Lt. Baddely in the Transactions of the Literary and Historical Society of Quebec for 1829. The height of the rock above the sea is 225 feet, to the base of the pillars of basalt 180 feet; the height of the columns themselves being 25 feet. The columns are quite regularly prismatic and of nearly the same size and nature as those of the Giant's Causeway.

Ascending the terrace, carpeted with the mountain trident, I climbed up the cliff over the basaltic steps, by the only means of ascent situated on the eastern side, where the columns had been worn away by a little stream, on top of the flat table, which was 125 paces broad at the widest part. The ends of the prismatic columns occasionally protruded through the dense

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matted covering of curlew-berry or Empetrum. The air was cold, chilly, reeking with the sea-drift, and the gale buffeted my face as if a demon were trying to throw me over the cliff, down to the sea-margin of former days.

From the summit of the table the view was an interesting one, though the atmosphere was very hazy. Belle Isle was shut out of sight by a thin bank of fog or thickened vapor which lay on the sea to the eastward. A few miles up the shore was another cliff of basaltic columns, the bases of the pillars wrapped in snow. There are in this bay eleven sea-terraces which mark the former levels of the sea, eight of which could be seen from the top of this rock. On the west side the terraces slope towards the north, while on Castle Island they slope towards the southwest. The most distinct example of these terraced sea-beaches lay at our feet, forming the western shore of Henley Island (on which the Devil's Dining Table is situated). This magnificent beach rises 180 feet above the sea-level, and when the sea covered it the waves washed the base of the basaltic pillars, as indicated by the débris of broken columns forming the talus at the foot of the cliff on which I stood. This beach is composed of three terraces, and the two lower ones widen out into delta-like expansions on the northwest end of the island, which are free from the usual covering of moss and curlew-berry, and are so distinctly marked with windrows of pebbles and gravel that it would seem as if they had been but yesterday thrown up by the waves.

Greville's Fort*, as we may name it, the ruins of which

* According to a writer in Harper's Magazine for May, 1864, who describes this fort and gives a plan of it, the fortifications were supposed to have been

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are quite distinct, was built on a broad terrace not far above the sea. On the mainland, north a little east, are three beaches with two terraces, which were beautifully marked, and corresponded with the two lower terraces at our feet, though covered with the rich deep green of the Empetrum leaves. Pitt's Arm and Châteaú Bay are also terraced, the beaches themselves of unequal size and height, but the terraces, as we should expect, are of even height throughout, as they mark the former level of the sea. One of the beaches on Château Bay was remarkably steep, composed of large, sea-worn bowlders, and overhanging like a precipice the winter houses below. Indeed, all along the Strait of Belle Isle from the Mecatinas to this point, wherever there is sand, gravel, or bowlders, the sea has, when at higher levels, rearranged and sorted them into terraced beaches or sea-margins. The future geologist who visits this coast will have an interesting task in measuring the heights of these terraces and comparing them with those of Northern Labrador, of Arctic America, of Greenland, and northern Europe. These beaches are also seen in inland river-courses, and by every pond and lake; they are not, as along the coast of Maine and Massachusetts, concealed by vegetation, bushes or forest growths; but here, owing to the absence of bushes and trees, they were as distinct as if the Labrador peninsula had been upheaved but a year ago. Darwin has studied the formation of the terraces along the coast of South America, where the elevating forces were undoubtedly volcanic, but the nature of the causes which in the northern hemisphere have re-

constructed by the French Canadians, by whom it was abandoned in 1753; another author states that it was built by the Acadians.

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sulted in the secular elevations and depressions of the land, such as took place during and after the glacial period, is purely conjectural, and belongs to the domain of theoretical geology. To study the causes we must first learn the facts, hence the careful examination of the oscillations of the eastern coast of America from Aspinwall to high polar latitudes is of the first importance. The measurement and comparison of the ancient sea-beaches on a coast like that of Labrador and Arctic America, where they are so easily perceived, will well repay the labor and time involved.

Robert Chambers's interesting work on the ancient sea-margins of Norway and Sweden gives valuable data for comparison with those of the opposite coast of Labrador, and from the rough observations which have been made it would seem that the oscillations were about the same, both in height above the sea, and in time, on each side of the North Atlantic. I have also seen well-marked terraces in Puget Sound which are beautifully marked, and these should be carefully measured and compared in height with those in the arctic region and Labrador. It was with no little interest that we observed the old beaches on the Labrador coast, and we shall note their occurrence in the following pages wherever seen.

We remained on the top of the Devil's Dining Table until the sun had set and the darkness began to creep over the scene below. Whether his Satanic Majesty was concerned in the transformation which then came over the scene we will not undertake to say, but as the sun went down the rocks and hills beneath seemed to diminish in height; an undefined, subtle, neutral tint

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spread over the landscape; a brownish haze due to the vapor in the air came in from the sea and settled over the hills far and near, and as the twilight came on the hills were still more dwarfed in size, when the chill southwest wind from the Gulf, the coldest that blows over this exposed point, sent us back to our vessel, where the thermometer at 8 o'clock in the evening was 44° F.

The fishing-hamlet of Henley Harbor consists of a few dwelling-houses, some of them inhabited during the winter, with fish-houses and light wharves here called "stages." The winter houses are built of thick boards, with flat tarred roofs, the sides of the houses being well battened. The domestic animal here is the dog, Newfoundlanders—seven of them at one house—brought up by the fishermen for the summer: there were no Eskimo dogs or Eskimos at this point, though in the last century they here congregated by hundreds. The fish-houses were rude structures of one low shed, roofed with turf and built on piles, reminding us somewhat of pictures of the ancient pile-dwellings of prehistoric Switzerland.

The fisherman's sail-boat is a ponderous, clumsy affair called a "jack." It is twenty-five or thirty feet long, with not much breadth of beam, rudely built, with short masts, and small sails stained red or black, or with both colors; the oars are of spruce, and very large and heavy, and the stern of the boat is provided with two stakes, such as whalemen use for sculling.

I interviewed a Mr. Stone, one of the settlers, regarding the fisheries and hunting at this point, and he gave me the following facts: At the height of the herring fishery in August—and it should be borne in mind that this fish is only a summer visitant, not spawning on the

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Labrador coast, but passing up, as Hind in his work on the Labrador peninsula states, as far as Hudson's Strait —Stone has caught 200 barrels in a season. He has to pay twelve barrels for a hogshead of salt, the price of which is now (1864) very high. He secures 800 quintals of fish at 18*s.* a quintal, which amounts to £720 for a successful season's work. He can cure the fish on this coast during the short summer, and is now building a shed for this purpose.

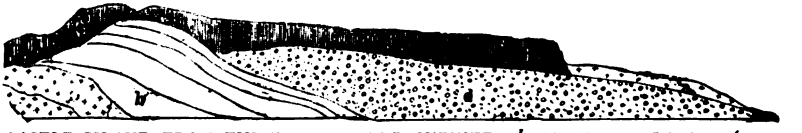
Of salmon 180 quintals are taken in a good season; they are pickled and sell at the rate of $5.00 a quintal (112 lbs.), so that he would realize about $900 from this fishery; but considering that he had a family of ten children, it is not probable that on the average he more than comfortably supports his family, and in many summers the fisheries on this desolate coast are a failure. And to show what little chance there is to retrieve his fortunes by the products of the winter's hunting, he told me that last winter nothing was shot about Château Bay from Christmas until the first of February. During the entire winter but a single partridge was shot, while at the same time they were very abundant at Blanc Sablon, showing that possibly these birds are somewhat migratory, going in flocks from one point to another in search of food. There are now neither beaver nor otter, nor silver nor black foxes to be had; only two or three wolves were shot, and two deer. When I asked him what the people would do if the hunting and fishing continued to fall off, he replied hopefully, and in his fisherman's dialect, "Oh, we'll have a spurt by and by." He added that the S.W. wind was in summer "the coldest wind that blows." Winter comes on in November; by

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the 10th to the 20th of this month the lakes are all frozen over, and by the 20th the harbor is frozen far out into the Strait, while in winter they can go out in sledges on the ice to Belle Isle.

The people here in general were well-mannered, though rough and out-spoken, asking freely of our stores, and commenting as freely on what they considered poor returns in trade.

To return to the Devil's Dining Table, whose geology is interesting: it is a high ovate mass with vertical sides and a flat top, which slightly inclines towards the south-west, and consists of two layers, showing that the rock is the remains of two separate eruptions, the lower consisting of regular prismatic five-sided columns, each about two feet in diameter, fluted on the sides and curiously worn by transverse impressed lines. The basaltic mass rests upon the upturned edges of strata of Laurentian gneiss which have been penetrated by dikes of syenite. North of the basaltic cap, the underlying rocks



CASTLE ISLAND FROM THE WEST; *a*, RED SYENITE; *b*, GNEISS; *c*, BASALT (THE DEVIL'S DINING-TABLE); *d*, RAISED BEACH.

are least disturbed, being reddish gneiss-like or foliated syenite, crumbling and quite fissile, dipping at an angle of 50° south, 25° east; just beyond, this reddish rock runs into the usual dark Laurentian gneiss of the region. Upon submitting a specimen of the basalt to Mr. J. S. Diller, lithologist of the U. S. Geological Survey, he tells me that it is a doleritic basalt.

At the southeast end of the island, along the shore

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HENLEY HARBOR AND CASTLE ISLAND, WITH THE DEVIL'S DINING TABLE. (From a photograph by Bradford.)

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looking out towards Belle Isle, the flesh-colored syenitic rocks present a rough and broken front to the ceaseless swell of the Atlantic, rising from seventy-five to a hundred feet above the waves, the beetling crags broken and pierced by deep ocean caves; with jutting headlands and little pebbly beaches nestling between them—all the characteristic scenic features of this syenite, whether at Nahant, or Mt. Desert, or on the Labrador coast.

The southern end of Castle Island repeats the geology and scenery of Henley Island; but a little farther down, away from the sea-cliffs, the syenite and gneiss meet, and seemed splashed together, like two masses of paste or dough which has been stirred up and baked. In places, both rocks were interstratified, dipping north and south in much disturbed strata, but with a general inclination towards the north.

The first of July saw us released from our prison; the day was clear and delightful, and a light southwesterly breeze bore us along a remarkably bold and picturesque coast. About two miles from our harbor is another trap overflow capping and, at the southwest end, concealing from view the syenitic base; at the northern end the basalt is columnar.

We soon came up to our first iceberg, a magnificent pyramid of ice perhaps a hundred and fifty feet high, white as Carrara marble, smooth, as if fresh snow had fallen on it during the past night, lending it a virgin whiteness, here and there brought more clearly into relief by the subtle azure blue reflected from the sea. Across its base ran several suggestive cracks, and though we sailed within two hundred yards of it, it was rather risky, and we remembered Scoresby's stories of the dis-

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asters attending the overturning and breaking of floating bergs. Captain Handy, whose life-long experience as a whaler in arctic regions made him a good judge, remarks as we are passing that a berg will not usually injure a vessel unless a piece of ice falls upon it, but that the waves will swamp a boat. At Resolution Island he rowed past an immense berg, so that it could almost be touched from the boat, saying to himself, "It won't last three weeks;" he had gone scarcely three ship's lengths, when, with a report like the discharge of a park of artillery, it burst into a thousand pieces, many still forming large bergs; the boat was put head-to, and nearly filled with water, but there was no further danger.

Off Cape Charles the coast grows more broken and hummocky, more so than west of Château Bay. This is partly owing to the fact that we look directly up into the fjords and bays, and that the headlands run out towards us. We pass Battle Island, a comparatively low island,



A, CAPE CHARLES, 654 FT. *B*, HARE ISLAND; ENTRANCE TO CAPE CHARLES HARBOR. *C*, CHARLES BAY.

with the "ice-loom" or mirage resting over it. We were glad to pass Battle Island Harbor, which has a bad reputation, or, to use an Anglicism, is a "nasty" place. The entrance is very sinuous, the turns short, and the vessel must answer her rudder quickly when going in. Our fishermen enter it late in the season, as "it is a place that holds fish late." Perhaps half of the harbors here are unknown, and the fishermen seldom have occasion to enter the innermost ones.

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The ice-pack which we were soon to encounter lay north and east of us, with the "ice-blink" over it. We pass Outer Battle Island, and the "Two Sisters," bare, low islands of nearly white gneiss rock. We now sail into the ice-pack, and are gradually surrounded by floes,



OUTER BATTLE ISLAND SEEN FROM THE SOUTHWEST; *A*, CARIBOU ISLAND.

though they are not near enough to impede our progress.

The shore of Caribou Island—for there are two of this name on the coast—is of a singular pale gray shade from top to bottom. The people ashore, struck by our model and spars, so unlike the other craft on this coast, set the British flag to ascertain our nationality.



CARIBOU ISLAND, BEARING TWO MILES WEST.

We pass St. Lewis Bay, a large broad indentation, with its north shore evidently syenitic, as the sea-wall is high, and the rocks rough and fissured, and more broken than lower down; the headlands of syenite probably extend out from the gneiss mainland.

The ice-floes become larger and more hummocky than any we have seen before. A humpback whale now pre-



CARIBOU ISLAND, BEARING WEST.

sents a broadside view of himself, with his angular hump, small fin, and as he "sounds," reveals the pale underside of his tail and flukes.

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At Spear Point the outline of the coast is very rough; at the entrance to Spear Harbor, which is a shallow bight, there is a high, sugar-loaf island; two black-sailed "jacks" are entering it. Cape St. Francis is a bold, syenitic headland. Over Square Island, which now comes in sight, being fifteen miles ahead, there is a fine mirage, with castle-like, shadowy forms resting on the rock. We are now sailing between the ice-pack and the shore, one nearly as solid in appearance as the other. The wind is still off shore, but should it change to the eastward the ice would come in upon us and choke up the bays and harbors. Behind us is a pale bluish haze which passes into a well-marked mirage, and as we sail on it raises the higher points of the land beneath and expands above with weird, strange effects. Beyond us the mirage magnifies the larger floes into huge bergs.



NORTH SIDE OF FISHING SHIP HARBOR.

In St. Francis Harbor is a "room" and a "look-out" house; a small bay beyond appears to be filled with ice. The coast at Fishing Ship Harbor is unusually rough and broken, like the waves of a chop-sea; and there appeared to be two terraces at this point, the upper one very high, but whether of gravel or of rock was difficult to distinguish. The wind now become very changeable and baffling, veering from one point to another; and our progress was compared by the Captain to sailing up the Potomac. Passing by perpendicular sea-cliffs, and a

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bold headland on which are dead spruce trees, the rock on the north side of Occasional Harbor changes its char-



OCCASIONAL HARBOR.

acter, becoming a gray, Labradoritic syenite, like what we afterwards found on Square Island.

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CHAPTER VIII.

A SUMMER'S CRUISE TO NORTHERN LABRADOR.

III. FROM CAPE ST. MICHAEL TO HOPEDALE.

CAPE ST. MICHAEL rises from the sea in the boldest, most vertical cliffs we had yet seen; they are perhaps from two to three hundred feet high and pierced by five caves, one very large and deep, and another oven-like. In one of the bights indenting this promontory there are four irregular but well-marked rock-terraces in the gneiss cliffs. On a following headland the syenite is seen to be interstratified with much-distorted gneiss strata, and penetrated by a deep fissure with remarkably fresh and angular sides. At the head of the bight is quite a forest of spruce. We are now off St. Michael's Bay, at the mouth of which is Square Island, with Sugar Loaf Island just beyond, and now the contours of the land-surface again begin to be rough and broken.

We run in here to make a harbor, and as we enter it a pleasant breeze blows off shore; it is refreshing in its warmth and in the balsamic flavor of the spruce and firs of the interior. We are now in a completely land-locked little box of a harbor in Square Island, the three "tickles" or narrow passages leading into it not in sight from where we were to lie moored.

While our vessel, which had come in by the wrong tickle, was, by a process of towing, and at times by taking advantage of slight puffs of mind, slowly work-

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ing into her deep little harbor, where she anchored in thirteen fathoms, some of us landed, and what a scene lay before us! On every square rod of flat rock on the steep sides of the harbor was a Newfoundlander's "tilt" or summer house. The sides made of logs or plank, the roof of turf, a square chimney of wood and mud, the four corner-posts projecting above. They were scattered about on the rocks like bee-hives, under the shelter of the cliffs on a low promontory, while the landing-places or "stages" were supported on long poles.

In the miniature garden-lots some of the children were turning the sod with rude spades, others were bringing soil from the naked rocks about into protected places where they were to attempt the cultivation of a few turnips and cabbages. On the shores of the harbor was a narrow margin of grass enriched by the drippings of years from the fish-flakes which, supported on stakes like those on the Maine coast, ran down in parallel rows to near the water's edge, where were ground-flakes, or floors of poles lying on the ground. The sides of the tilt were here and there ornamented with a sealskin tacked against the wall. The houses of the "long-shore-men," or those of the permanent residents, were clapboarded and a little better looking than the tilts. It was warm and truly delightful ashore, the wind coming from over the hills and mosses; the thermometer was 70° F., and we learned that for two days it had been unusually warm and pleasant.

The insects formed an assemblage which in northern New England would be regarded as a mixture of April and early June forms, *Corethra* and *Tanapus*, two gnats, which in New England are April forms, mingled with

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saw-flies which appear with us early in June. The leaf-rolling moths had not yet appeared; a few bumble-bees were humming their familiar tune, but, as we thought, in a subdued minor key.

Just before sunset we climbed a steep round hill, rising perhaps 500 to 800 feet above the harbor, and what a strange, peculiar scene was spread out before us! Far inland to the westward there was a fire in the woods, and the smoke filled the air towards the interior and was carried far seaward; the sunlight passing through the smoke gave a strange appearance to the glowing western sky, the transformed light falling bronzed and red upon the broad bay dotted with "skiers," or small low islets; and tinging the distant hills, one of which, a mountain mass of gneiss, seemed to be over a thousand feet high.

In the evening it grew cool and damp: a large cake of floe-ice higher than the rail of our vessel floated down upon us and stranded on the shore. All through the night there was a continual sound of running water dripping in streams from its under side, the gurgling and trickling keeping one awake.

The next day was cloudy, with a southeast wind, so that we could not venture out of our harbor. I went with a party of trout fishers from our vessel to a chain of lakes containing, besides a few small trout, eels and sticklebacks. The insects were more abundant in the sheltered valleys than along the shore. In the shallow ponds were chrysalids of the stone-flies and case-worms, the latter having been found in the larval condition at the Mecatinas. There were also pupal dragon-flies, and under the moss and green herbs on the side of a

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little rill, earthworms, groundbeetles, cutworms, and the maggots of the crane-fly.

Here mingled with an Empetrum-like plant was the *Andromeda polifolia*, with bumble-bees probing its deep flowers; sedges were in flower, one like our *Carex pennsylvanica* and perhaps representing it in the Labrador flora; the leaves of the hackmatack or larch were half an inch long, but the birches and mountain-ash were not yet fully leaved out; blue and white violets were sprinkled among the low sedges, while the flowers of the cloud-berry were now dropping off. The *Viburnum lantanoides* was scarcely full-leaved; the bunch-berry (*Cornus Canadensis*) was either in bud or else with small green flowers. The gold-thread, or Coptis, was in full flower; the fire-weed (*Epilobium augustifolium*) was but six inches high, the buds not yet apparent.

Robins were singing in the old familiar way, and the white-crowned sparrow was flitting about as if thoroughly at home and rather enjoying the desolateness of the scenery.

The geology of Square Island harbor is varied by the presence of a peculiar dark syenite due to the labradorite which replaces the flesh-colored feldspar of the syenite to the southward, while there are large masses of dark green actinolite with a little quartz, and some iron pyrites. This peculiar eruptive rock is weathered into high rounded conical sugar-loaf hills, which lends a peculiar feature to the scenery of the coast. At certain points this rock passes into a finely-grained gneiss, with the scenic features of that rock, but yet combined with an added feature due to its granitoid character; the rock crumbles rather easily, and on the shores of the

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harbor and lakes, blocks of all sizes, angular or weather-worn, fall down, disrupted by the frost. No boulders, i.e. travelled rocks, were to be seen. The masses of labradorite are translucent and opalescent, but still not of the precious variety, of which, however, I afterward purchased fine specimens from the Moravian missionaries at Hopedale. No drift or glacial scratches were to be seen about here, and none had yet been observed on the coast, though they were of course always in my thoughts, and I was disappointed at not finding any, attributing their absence to the rapid weathering of the rocks on this coast.

The deep broad bay at whose northern entrance Square Island is situated must have been filled with glacial ice, as the skiers or low islets of gneiss dotting its surface had evidently been ground down and moulded into their present forms by land ice.

The rock terraces observable here were interesting; they were ten or twenty feet high, with the vegetation growing at the foot of the little vertical precipices. On their upper third the hills about our harbor were bare, where in similar situations in the Strait of Belle Isle the rocks would be covered with a thick and matted growth of Empetrum and reindeer moss. The steep precipitous sides of the hills facing the harbor plunge naked and dark into the water, and from their summits we can look directly down upon the decks of the vessels at anchor, overlooking the "tilts" and "stages" on shore.

In the afternoon the vicissitudes of a dredger in such a harbor as this were well illustrated. I put my dredge down at the depth of thirty fathoms at the mouth of a "tickle," and the results were plenty of a little snail

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(*Margarita cinerea*), the dead shells tenanted by little hermit-crabs; the two varieties of *Mya truncata*, two beautiful ten-armed starfishes (*Solaster papposa*), beautifully roseate in the centre, as well as at the middle and tips of the fingers; the omnipresent knotted sand-star (*Ophioglypha nodosa*) with fine gray and red shrimps, and mingled with the deep-water forms were two littoral species, the common edible mussel and the *Littorina rudis*. Another hard pull—and dredging in thirty fathoms by hand, in these days of donkey engines and steamers, with all the paraphernalia of the modern dredge, is no fun—over a rocky bottom and not a thing in the dredge was a disappointment, while the third pull off a steep precipice brought up the dredge filled to the brim with a soft ooze, containing only two or three worms and a few dead shells.

On Sunday, the 3d, services were conducted by Rev. David A. Wasson, one of our party. About twenty of the fishermen came aboard, and after the meeting we found them very communicative, the sole topic of conversation, that which is the staple talk on these shores, being the fisheries, both of the cod and seal. One sealer of 120 tons during a cruise of three months laid in a cargo of 148 tons of seal's fat obtained from 4700 seals. Last year (1863) twenty to thirty sealing-vessels were lost in Green Bay, and six hundred men were obliged to abandon their vessels and walk home, "with nothing but their boots," on the ice which was packed in towards the shore. A few remained aboard. March was an open month, while April was cold and frosty; "the ice was packed in 25 or 30 feet, making it bad for the sealers."

On inquiring of an old Newfoundlander why they

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had been driven off of their own fishing-grounds and obliged to spend the season on this coast, he replied, "Oh, it was the French. Our fishermen have been on this coast for seventy years. It was after the treaty that the French began to fish from Cape St. John around to Cape Ray, and for forty-six years we have come up here in this way. By this treaty the French were not allowed to take anything away from the shore, nor to cut timber above a certain size, and were not, and still are not allowed to reside on the island of Newfoundland. They leave from fifty to seventy men to take care of the fishing establishments or 'rooms,' an officer being set over every ten men to keep them in subordination, while a doctor is stationed at each 'room. The men live like dogs, cooking out of doors; they are allowed the first catch of fish for themselves. They cook Sundays—after early morning prayers—and work the rest of the day." It is needless to add that the French are looked upon as intruders by the English settlers.

The Newfoundlanders themselves, at least the poorer families, are obliged to fish on credit, running in debt for their outfit, which is worth £190, including salt. When the season is over and the fish is sold, they may clear £15, as they often obtain 350 quintals of fish. The "longshoremen," of whom there are here seven families, are sadly improvident, often giving up fishing towards the last of the season and idling; hence as the result, when the traders have failed them, they are reduced, as happened last winter, to actual starvation. Owing to the lack of fresh meat and vegetables they are afflicted with the scurvy. One man thus suffering showed me one of his legs, which was swollen nearly

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twice the size of the well one, and covered with purple spots. I asked them how they spent their time in the winter, and they said: "Oh, we get a stick of firewood" —and it is not much more. But a single deer was shot here last winter by these thriftless people, while the Eskimo, who came down from "the nor'ard" in their dog-sledges, shot fifteen.

The walrus at times appears as far south as this harbor, one having been shot about fifteen years ago. It evidently made an impression on the minds of the "long-shoremen," as the circumstances of its appearance were treasured up for years after. It lifted its head above the water near a boat with a single man in it, who was nearly frightened out of his wits, as he "thought it was the devil." His web-footed majesty sank beneath the waves to reappear to the same man three-quarters of a mile away, who was not too much terrified to throw as a peace-offering to the monster a herring, which it swallowed and then disappeared.

By daylight this morning the ice began to come into our snug little harbor, brought in by an east wind; it drifted in during the day, completely surrounding the few vessels at anchor; though it was a warm, pleasant day, and the thermometer was 70° at noon, by night it grew cold, reaching 39°. The ice often comes in through the narrow "tickles," and becoming imprisoned, remains until a strong west wind blows it out. In this way large icebergs frequently come in, as the tickles are about thirty fathoms deep, there being no friendly bars at the entrance to detain these unwelcome visitors. On one occasion, a Saturday night, as a man told me, an iceberg "as tall as a steeple" floated in as if to make a safe harbor,

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and became anchored within fifty yards of his "stage." Just after he and his family had gone to bed, the berg broke to pieces—"foundered"—and nearly swamped his boat, but did not carry away his stage, which was built upon a rock, though the waves washed a row of puncheons off from a neighbor's stage and entered the house, driving out the occupants.

Of the personal appearance and habits of the majority of the summer residents there is not much to be said. Living in dirty, forlorn tilts, smoked and begrimed with dirt, the occupants in some cases thoroughly harmonize with their surroundings: their features and hands are smoked as dark as the herring they eat, and their rough life is more or less demoralizing; but certainly law and order are well maintained on the coast, and no cases of immorality came to our ears.

The Fourth of July saw us still ice-bound. We could easily walk ashore over the floe-ice; some of the floes were higher than our vessel's rail, it being next to impossible to force our boat through the too narrow "leads' between the cakes. Our surroundings were thoroughly arctic; the harbor choked with ice-cakes, while the high, dreary cliffs, rising on every side, made the outlook so polar and frigid that only a live white bear in the foreground was needed to enhance the resemblance.

This glorious day was celebrated by the imprisoned party as best they could. At nine o'clock in the morning a salute was fired from twenty-four gun-barrels, the largest number we could muster. The exercises of the forenoon consisted of a prayer by Rev. Mr. Wasson, and an oration by a member of the legal profession, Mr. Ham, followed by the John Brown song. For our dinner we

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had a fresh salmon and canned peas, excellent after-courses, washed down with champagne brought out with especial reference to the occasion by Mr. Phœnix. The evening was thick and foggy, and at sunset the American flag was again saluted and cheered, and the ship's bell rung, due response being made by the people ashore and by the crews of the other vessels, while the captain of one of the Newfoundland vessels politely sent up rockets, Roman candles, and burned Drummond lights. The effect of the fire-works in the fog and mist, the glare reflected from the ice into the sky and upon the surrounding cliffs, the cheers and shouts, which were prolonged to after eleven o'clock at night, all made a scene, we venture to say, never before witnessed by Labradorians.

Before dinner a party was equipped and armed to the teeth to go on land and look up a black bear which was seen ashore yesterday. I joined them with my insect-net. We pushed and shoved through the ice, at times hauling the boat over some refractory floe. A cloudy, misty day is anywhere unfavorable to insect life, but on this coast scarcely an insect is then to be seen, so I turned my attention to the tilts and jacks. A raccoon's skin was shown us, and we were told that four or five years since two white-bear cubs were captured near here and carried into St. John's, while a large white or "water bear" was shot last week up at Tub Island. This proved not to be a fish story, as Mr. Bradford afterwards secured there a good skin which was destined to adorn his New York studio on Tenth Street. A white bear's skin without the head is worth more than that of a black bear, for which six dollars is asked.

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The next two days were climatically repetitions of the Fourth, a light easterly wind holding the ice in the harbor. Going ashore over the cakes, we spent the day in entomologizing, and here the first grasshopper occurred, found floating in the water of a pool; at first I thought it was a wingless form called *Pezotettix*, from the shortness of its wing-covers, but it proved to be an allied winged form; two other wingless specimens were the next day found on the hill-side; a thousand-legs (*Julus*) also occurred under the leaves and sedges.

The highest hill in sight from the deck of our vessel was measured by Captain Handy from sextant observations, and found to be 397 feet above the harbor; a hill behind it rose to a height of over 400 feet; another higher hill, used as a lookout, was about 800 feet high; the mountain across the bay must therefore be not less than 1,000 feet high, while those in the interior, near the head of the bay, seen from the lookout, were probably not less than 1,500 feet in height. Looking out to sea from this high elevation the ice was everywhere in view with leads between the floes, and here and there a vessel caught in them, besides two broad, massive bergs apparently forcing their way through the ice-field. On the top of this hill we were in a region of transported rocks, genuine ice-borne bowlders, which could be seen on all sides dotting the tops of the neighboring hills; they were of all sizes, an occasional rocking-stone among them; one huge rock was nearly forty feet long and fifteen feet high. Many were overgrown and partly concealed by the matted growth of the curlew berry; bowlders are also seen scattered over the bottoms of the shallow ponds, and in the brooks and streams. They appear to

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have travelled but a short distance from their native rock, as they are mostly large and angular, though some are well rounded. The hill-tops, as well as the sides, have been moulded by ice, *roches moutonées* being as distinctly marked here as in New England, and the ice must have moved from the north, a little west; but owing to the weathering of the surface of the rocks in this severe climate, no grooves could here be found to determine the exact course of the ice. The ranges of hills, however, and the longer diameter of the ice all have a N.E. and S.W. course, while the bays and fjords ran in a N.W. and S.E. direction, and this was the course in general taken by the land-ice.

Going ashore again after dinner and following up the chain of lakes, I saw a prostrate canoe or paper birch a foot in diameter, and another one, also lying down, but smaller, only eight inches thick—good-sized trees for Labrador: also spruce trees ten inches through. In the ponds the cow-lily was just beginning to bud, though not yet reaching the surface; a little cyclas-like bivalve (*Pisidium steenbuchii*), hitherto only known to occur in Greenland, was common in the mud at the bottom of a brook, while a slug (*Limax agrestis*) was found ashore, under a stone, just laying its pellucid eggs; and in another brook was found a fresh-water sponge. A robin's nest containing three eggs with young nearly ready to hatch was detected on the bough of a spruce, and it is most probable that this bird raises but a single brood of young on this coast. Under a hummock of moss and sedges lay concealed a dormouse's nest. The curlew-berry was still in blossom, its flowers like those of the blueberry, but of a beautiful pale purple. About the inner-

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most lake were, besides spruce, balsam firs and larches, the latter six inches thick; the *Kalmia glauca*, or arctic laurel, as it may be called, was just beginning to flower.

The 6th closed cold and damp: the northeast wind had packed the ice in our harbor thicker than ever, while the thermometer went down to 38° F. The fishermen, however, managed to seine a few cod and herring.

The morning of the 7th was the coldest we had experienced, as the ice formed around our vessel between the cakes of floe-ice. After a good deal of exertion a few of us managed, after much tugging and pushing and forcing the ice-cakes apart, to get ashore in a boat; but we had, on returning, to leave our boat ashore and walk back to the vessel. Here I found, my fingers numbed with the cold, the caterpillar of probably *Arctia quenselii* on the larch, which also occurs on the Alps, the mountains of Norway, and in Greenland and Colorado. It was a truly mimetic or protective form, as on first sight it looked like a bunch of moss so common on these trees. At noon it began to rain, and a regular northeast storm set in. Through the next two days (the 8th and 9th) we were still ice- and wind-bound, with cold, rainy weather. Sunday the 10th was a repetition of the three preceding, although part of the day the wind was from the southwest. The fishermen reported a fight outside of the harbor between a whale and a killer and sword-fish, in which the whale got worsted, turning exhausted upon his back. The night ended in rain, which continued through the next morning; the wind was at first south, then southwest, and at night again returned to its favorite quarter, the northeast, with very cold weather. During the day there were some strange cloud effects, the

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higher belt of clouds moving from the southwest, while below the fog scudded in from the east. After supper a squall from the west struck us: this carried the ice off-shore some distance, but from the lookout we could see the ice-pack closely hugging the shore to the northward of our harbor, and we beheld a few icebergs, huge cubical blocks, rising above the ice-pack. We hope to get out to-morrow, as several vessels have come in which left Henley Harbor on the day we did, and which have been ice-bound in Fox Harbor, just above us.

The people complain of the lateness of the season: the ice holding so late and in such an immense and unusual quantity is, they say, "killing the cod-fishery." We had found a few days previously what we supposed to be young capelin an inch long, with the tail still heterocercal, and they are now coming inshore to breed. This interesting little fish, so valuable as bait in fishing for cod, remains near the coast through the winter in deep water, and is often found in the bay.

The ice having temporarily left the harbor, we could again dredge, and we had excellent success; the number and variety of marine animals, all purely arctic in type, being very pronounced.

Here, more abundantly than elsewhere, though in deep water, occurred large sea-anemones (*Metridium marginatum*) and gorgeous sea-pinks (*Urticina crassicornis*), with slashes of red on a flesh-colored ground, and as beautifully painted as any carnation, besides shrimps with not less delicate flesh-red and vermilion tints. The colors of arctic marine animals are sometimes pale and lifeless, but more often of rich salmon and flesh tints; passing into deep red. Why deep-sea forms

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when highly colored are always of some shade of red is not yet well understood, but such is the case with holothurians, starfish, sandstars, crabs, and shrimps, as well as polyps and molluscs, whether living at the depth of 100 or 1,000 fathoms. This evening a trader came into port, which had been in eleven harbors since leaving us at Salmon Bay.

The 12th was another of the long, long, weary days of the fortnight spent in watching and waiting for our release from this now detestable harbor, more like a rocky cage than a haven of rest. I went a-dredging and lost my dredge at the first haul on a rocky bottom, which added to the aggravations of the weather, and left but one other for the rest of the summer's work.

The bay was now full of capelin; cod were also being netted as well as salmon, which is said to disappear from here about the 15th of August. Salmon, by the way, were here worth 40 cents apiece; at Henley Harbor we paid fifty cents for one. The cod are now breeding, as the spawn is full and ripe, and their livers are poor and lean. Now the "stages" presented busy scenes, as there was a "spurt o' fishing"; one day seven quintals of cod were pitched out of the boats upon the wharf; here the men leave them, turning them over to the tender mercies of their wives and sweethearts, and it is to be hoped that the gentler sex on this coast are not in other respects so fierce and sanguinary as when left alone with the cod. The "headers," in petticoats tucked up so as to show their homespun stockings and stout shoes, their sleeves rolled up and in their hand a formidable knife, in an instant seize the cod's lifeless corse, and with a dexterous stroke behead it; the body is thrown to the

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"gutter;" the woman or maiden thus styled slits up the belly, tears out, like an augur of old, the entrails, but doesn't stop to inspect them, throws the livers into a hogshead, and the disembowelled fish to the "splitter;" another girl or woman grown, known by wearing a mitten on the left hand, who attacks the fish on the reverse side from the "gutter," makes a deep cut along each side of the back-bone, dexterously but with her mittened sinistral hand shies that important part of the fish's skeleton into the harbor, while the fish, after receiving this threefold treatment, is emphatically slapped into a sled-barrow and carried to the other end of the low shed to be salted, when it is ready for the flakes.

While on shore we saw at one of the houses a musk-rat's skin, which had a much better, finer fur than those at home.

On the 12th the wind veered from the north to the northeast, and it lighted up so decidedly towards noon that we hoped to get to sea. After dinner, Mr. Bradford went out in the whale-boat to get a view of an iceberg, which he sketched from afar off. It was surrounded by cakes of floe-ice, which assumed a wonderful individuality. One in particular impressed itself on my memory: it was a lily done in ice, which nodded and swayed to and fro in the gentle ocean swell like a veritable flower moved by a summer's breeze; another was like a woman's torso: and so passed in review a series of animal and plant-like forms of every conceivable shape, while mingled with the white ice were smaller pieces of dark, colorless ice which may have been severed from some arctic glacier. But before the artist's study was fairly made, the insidious northeastern breeze

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deployed a few skirmishers from the edge of the pack and soon brought the whole floe upon us. Down it came, borne by the wind and the Labrador current, at the rate of three or four miles an hour. It closed in at Cape Bluff to the north of us. We ran before the wind, soon leaving in the distance the twin bergs, with their myrmidons of the floe. On entering the tickle we found ourselves completely surrounded, well-nigh cut off from our harbor, but by dint of tacking and pushing the cakes to one side with our oars, and running over some smaller floes which gnashed and ground harshly on our boat's bottom, we got through just in time to escape being completely shut out. Not so, however, a boat's crew which had hurried out to pull up their salmon-nets, and who did not appear until long after we had boarded our vessel.

Our box of a harbor was again jammed full of ice, eight vessels riding at their hawsers, all ice-bound. And now looking through the pellucid water between the cakes of ice, our old arctic friends the Mertensia and Clione, welled up from below, seeking the surface, as cold and calm as the ice itself.

As the sun went down the fog succeeded the ice; but it hung low, leaving the blue sky above us, screening our craft even from the shore and in part from the neighboring vessel. Before the twilight fell the rays of the sun, then an hour high, passing through the mist gave rise to a "fog-eater," a broad, diffused rainbow, which was dispelled as the moon rose and peered in over the sides of the screen of fog.

Among the late arrivals was a Newfoundland fishing-smack which had two crews aboard, and with them six

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women, all unmarried, two of them mere girls, who lived in the same cabin with the men, but stowed away in dark holes and corners of the apartment. They were paid from £10 to £10, 7*s.* for the voyage of five months, or a little over a dollar a week, and their work was to "head," "gut," split, and salt the fish. Everything about the interior was forlorn, dirty, greasy, and not a soul aboard had apparently washed for weeks.

We remained one more day in Square Island Harbor, the 14th, which ended in a thunder-shower and a westerly squall, which cleared the harbor of ice and gave promise of release from our two weeks' imprisonment. It was warm and sultry in the forenoon, the westerly wind bringing in swarms of mosquitoes and black-flies, especially annoying while I was ashore beating the herbage and bushes for insects.

On the 15th we slipped out of our stone jug at Square Island, and with a mild southwest breeze, which freshened in the afternoon, we gaily picked our way through the ice and amongst the icebergs up the lane between the shore and the ice-pack, now fairly shoved to the eastward some miles from land. At noon, after making about ten miles, we lay to near a superb marble-white berg, weather-, rain-, and wave-worn, broad at the base, indented by a deep bay, into which the sea-swell rushed and foamed. Wasson and Phœnix got out their boat and rowed around it; Bradford made studies in oil of its many phases, its blues so impossible to thoroughly catch, as well as its ineffable purples. Another berg was like a huge block of city buildings, the foundations hundreds of feet beneath the waves; another was a huge

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pyramid stranded near an island, and looked like a glacier descending its precipitous sides.

As we go on through the watery lane huge floes swing off shore and are borne down past us by the strong Labrador current; the bays are still choked with ice which the southwest wind is forcing to the seaward. The ice is remarkably hummocky; worn into the most fantastic shapes. The coast has the same rude, broken, tossed, and disquieted appearance as about Square Island, but with more of the high conical sugar-loaf islands of Labradorite rock, such as we were now to see all the way to Hopedale.

At Seal Island the "Domino gneiss" of Lieber appears, protected seaward by high islands intermixed with low gneiss "skiers," and as we press on the shore becomes much lower, the coast-line straight and but little broken; but as we approach the Isle of Ponds the shore seaward becomes high and bold, perhaps 300 to 400 feet, with lofty sea-cliffs. These are formed by the dolerite or trap rock which has penetrated and overflown the gneiss. The scenery of these trap overflows is quite novel. The seaward side of Spotted Island is of trap rock, and on the west the gneiss rock is low and very slowly slopes towards the channel which separates it from the Isle of Ponds; there are also two or three trap islets which rise out of the water. Going ashore and ascending one of the trap hills, perhaps the remnants of some old volcanic crater which rises out of the surrounding gneiss, I can take a view of the whole island, see other trap hills rising out of the gneiss plain, which is studded thickly with shallow pools and lakes sunk in the peat, and is low and flat compared with the coast ten

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miles to the south; while northward this low land or basin stretches away for several miles, while twenty or thirty miles inland the country rises into high hills and mountains, the highest summit rising perhaps 1,500 feet above the level of the sea. This range or group of peaks was probably the Mealy Mountains situated on the northern side of Sandwich Bay.

The low plain before us evidently belonged to a distinct geological system from any that we had yet seen; it rested in a depression or basin of Laurentian gneiss, and was called by Lieber the "Domino gneiss," and probably belongs to the Upper Laurentian system.

The plain is worn smoothly, and slopes gradually toward Domino Harbor; scattered over it are patches of large cobble-stones, which indicate that it was once a raised ocean-bottom, now at least 125 feet high, which reached to the base of the angular masses of trap rock capping the gneiss elevation. Strip off the scattered masses of matted growth of curlew-berry and cranberry, and the smooth, wave-worn, pebbly surface would seem as if but yesterday won from the dominion of the sea.

Domino Harbor, or Domino Run, as it is called on the chart, is a broad, deep fissure which nearly divides the island in two, the shores vertical though not very high, with fishing-houses along the western side, under which were moored seven brigs with their sails "unbent," the bare masts rising but slightly above the cliffs. Not a tree or bush is to be seen in any direction, only low spreading masses of willow, belonging to two species: one of them just beginning to throw out its catkins; the other, with small, acute glaucous leaves, had done flowering. Running over the leaves of the willow was an

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arctic ground-beetle (*Carabus groenlandicus*), which had not before been found south of Greenland.

Here was the best summer-house we had yet seen, well built and tolerably attractive; two pleasant, womanly faces within, and a spaniel lying in front of the door. Captain Duff, the proprietor, had a spacious wharf or stage and a well-kept fish-house, while he had arranged the white quartz pebbles in an attractive way to form a drying-floor or flake, instead of using poles; and the walk from the stage to the house was neatly made of short poles, forming a corduroy-path. Another toad was here seen, which some one had brought from the head of the bay; the man said that they were only known to be found here and in St. Michael's Bay. We also were told that a polar bear was killed here two months ago.

We reached this harbor early in the afternoon, and some of the vessels which we had passed on the way after awhile came in and dropped their anchor near us; others sailed on all night, but gained nothing in the end. We astonished the natives and fishermen as we sailed past their slower craft—of which we passed to-day about thirty; some would in a flattering and good-natured way hold out a rope's end, asking to be towed. They told us they had seen ninety sail that day in the sound leading to the harbor.

In dredging at the slight depth of only seven fathoms, to my great joy that interesting and hitherto purely polar holothurian (*Myriotrochus rinkii*), came up; with it were associated the short arctic mya (*Mya truncata*), the Iceland cockle (*Cardium islandicum*), the Greenland Aphrodite, the polar starfish (*Asterias polaris*), the inevi

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table knotted sandstar (*Ophioglypha nodosa*), and other forms only previously recorded from Greenland.

The evening was rarely beautiful for this coast; the ice was out of sight, and the way seemed clear for a good run on the morrow.

The 16th proved all that we could have desired in point of wind, weather, and absence of ice. A fresh but warm northwest wind, sometimes almost blowing a gale off-shore, bore us a distance of forty-five miles. The thermometer at nine o'clock was 64° F. in the shade; at ten o'clock 84° in the sun, and at one o'clock P.M. 73° in the shade. Our way led through a broad sound inside of the outer islands, and then across the mouth of Sandwich Bay. At two P.M., however, our further advance received a check. We had crossed the mouth of Sandwich Bay and were approaching the Horsechops on the north side of the entrance to the bay, when the wind drew in from the north and headed us off, so that we ran back to Dumplin Harbor. As we entered we nearly ran aground; and then in trying to escape that disaster, we came near having a collision with a schooner's stern on the other side of the narrow entrance. On this occasion our pilot, Captain French, nearly lost his head, and it has been my lot on several occasions to sail with pilots who lost their presence of mind at just the critical moment when their senses should be ready at an instant's call. Thorough knowledge of the rocks, shoals, and headlands of a coast is not always united with the highest order of executive ability; but on the whole, no fault could be found with the management of our vessel; she was a Wellfleet oysterman, built by Donald McKay; her lines were beautiful, but she was not adapted for the

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perils of this coast and of semi-arctic navigation. We pushed on cautiously and too slowly for the impatient company aboard, but we all reached home safely, and ran into no great danger.

Within two hours after we had dropped our anchor a fleet of thirty-seven vessels of all descriptions—top-sail, fore-and-aft, and three-masted schooners, brigs and brigantines, and hermaphrodite craft—were at anchor in a line; they came in one after the other in single file, all having been headed off by the ice as we had been; and as they approached us, we, or rather our goodly vessel, was the recipient of admiring looks and complimentary ejaculations in Newfoundland dialect, the amount of room on deck and the cleanliness of our craft being the particular points of remark: and there *was* somewhat of a contrast, which appealed feelingly to our nostrils when we returned their calls. In the hold of one vessel I was delighted to see the head and flippers of a veritable walrus. This was alone needed to complete the experiences of arctic voyaging of the past three weeks. They found the creature, a young one twelve feet long with tusks four inches in length, about fifty miles from shore near the entrance to the Strait of Belle Isle; it was found dead, having been harpooned, and had evidently floated down in the floe-ice from higher latitudes.

An interesting feature of the day's sail was the raised beaches which marked the former level of the ocean. Twelve very distinct ones were seen from the vessel while on her course. At Spotted Island were two low but very regular beaches, perhaps forty feet high. On a small islet to the north, between two trap hills, was a beach which extended up to a height of perhaps from

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150 to 200 feet above the sea, and divided into three terraces, with very steep escarpments. On Stony Island, towards the east, was a small short beach between two trap hills, and a much higher one was on the northern side; on an island perhaps twenty-five miles north of Domino Harbor was a beach at least 100 feet high and facing west. Indeed it looked as if the entire coast and islands had just risen from the sea, while above the former level of the ocean, when at its highest point, the hills were strewn with bowlders.

We now passed larger banks of snow than had heretofore been observed: one in Mullein Cove on the south side of Cape North appeared to be nearly a quarter of a mile long. Cape North is a bold headland, fully 400 feet high, faced with rude, jagged trap rocks, and within composed of gneiss; and on the south side a low raised beach, with large trap islands opposite, called Greely Islands. We then pass Cape Noble, with its overhanging cliffs and a fine deep harbor; near it are "The Sisters," two low, flat islands, one with a trap dyke passing through the middle, the other one half black trap rock, the vegetation on it of a bright green, clinging to the black debris of the volcanic rock. From this point we could again see the ice to the northeast moving out to sea. After passing Long Island head, which seemed to be of red syenite and about 400 feet high, we sailed by Huntington Island, a noble mass of volcanic rock perhaps 500 feet high, with an evergreen growth seen in the bays indenting its shores.

On the mainland a large fire was raging, probably set by the Indians; the sky to the westward and all about us was lurid with the smoke. Here also we felt

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the full force of the Labrador current which hugs this shore, running at the rate of three knots an hour, its effects not much weakened by the outer islands. The water at the surface was perceptibly fresh, brought down by the rivers and streams emptying into these bays.

Going ashore in our harbor (Dumplin) we found the beautiful dwarf arctic laurel (*Kalmia glauca*) just in flower; associated with it was a narrow-leaved Ledum in full bloom, and very distinct from the Labrador tea (*Ledum latifolium*), which was only just beginning to flower; besides, it is more procumbent and lives on more exposed surfaces than the broad-leaved species. In one sheltered spot was a thick growth of spruce, mostly dwarfed, though one stump was seen to be thirteen inches in diameter. Dredging in four fathoms did not bring to light any novelties. On the north side of the island there was a good deal of ice. Before sunset the sky cleared in the west; there was a fresh westerly breeze through the night, and a good prospect of a fair day on the morrow. Salmon trout were caught here, and the sea-trout are at places common enough; but the shallow lakes do not abound in fish, although the deep lakes among the mountains of the interior were said by Davies, at the time he wrote, to be well stocked with them. Pike's Harbor was three miles above us, and Tub Island was also in sight.

From this point we could see the famous Mealy Mountain range, composed of lofty hills said by explorers to be from 1,500 to 2,500 feet in height; we judged their height to be not much less than 2,000 feet; they are certainly considerably higher than the mountains of Mt. Desert, Maine, the highest peak of which is

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1,500 feet. This range runs in a general northeast and southwest direction between Sandwich Bay and Hamilton Inlet, and it well deserves to be accurately measured and mapped. To the highest peak of this range we have given the name of Mt. Cabot, in honor of John and Sebastian Cabot. The position of Dumplin Harbor was ascertained by Captain Handy by reckoning from observations of the sun at noon to be in lat. 53° 48′; long. 56° 23′.

The 17th was a fine day, with the wind from the south, sometimes hauling east of south. We ran twenty-five miles across the mouth of Sandwich Bay to Tub Island, well known to the fisherman on the coast, and the farthest point reached by American fishermen; it is high and steep, and so named for its resemblance to a tub lying bottom-side up. Beyond this harbor the Labrador coast is the Ultima Thule of America; and here the services of our coast-pilot, Captain French, were to be supplemented by native guides. We now had high expectations of making new discoveries in the entomology, marine zoology, and geology of the northern coast of this little-known region. Tub Island was found to be in lat. 54° 12′, long. 56° 40′.

One of the most remarkable headlands on the coast is the eastern end of Horsechops Island; a lofty basaltic cliff with a human profile, the nose distinctly Roman and the forehead retreating. On the north side of the island were three raised beaches, at least 100 feet high. Inshore the land was very high (the highest portion 398 feet by the chart), with the snow lying on it in extensive fields.

A white bear was shot two years ago, on an island a

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few miles south of Tub Island, under the following circumstances: A man was walking along the shore with his little girl; they separated; she saw the bear and ran to her father; the bear also ran, and plunged into the water, where the man shot him. I was particular to inquire as to the occurrence of this animal, and from all I learned, it appears to be more or less of a permanent resident on the northern Labrador coast, though I at first supposed that it only occasionally strayed from the arctic regions; it would seem as if its range overlapped that of the black bear, the two species being found in the same localities north of Belle Isle.

We visited American Island, which is a little west of Tub Island, and colonized during the summer by a man named Williams; it is of light-colored gneiss, with extensive broad trap dykes and irregular masses of the same volcanic material. Williams was distinguished from other of his countrymen by having married a full-blooded Eskimo-woman. They had no children of their own, but had adopted, strange to say, a mountaineer or Naskope Indian child. The poor thing had been "burnt" by frost during the past winter, and still suffered from her exposure. On our way to the island we saw the fin of a killer projecting four or five feet above the water, moving rapidly to and fro in a school of grampus, as if engaged in combat with the latter, which were recognized by their small fins, only a foot high, which sometimes broke the surface of the sea.

From Tub Island we could easily see the land twenty miles distant on the north shore of Groswater Bay or Hamilton Inlet, Tub Island being at the southern entrance; it is, however, forty miles across the mouth of

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this great inlet, the largest and deepest bay in the coast.

Unfortunately we did not go up Ivuctoke Bay, or Hamilton Inlet, as it is variously called, though well meriting a thorough exploration, since it is the largest and deepest fiord on the Labrador coast. Its general shape may be seen in the map of Eskimo Bay. The principal settlement is Rigolet, a Hudson Bay Company's post.

The ice-belt was reported "as thick enough to walk on" a few miles to the westward, and the wind blew chilly and damp from that direction. Day before yesterday the floes were close in shore. Here we saw more sea-fowl than had been observed of late, a few puffins, murres, guillemots, and a pair of eider-ducks. Years ago these bays swarmed with fowl, where now they are well-nigh deserted. In "Old Man's bight," Captain French twelve years ago saw the wild goose in immense numbers. We did not see a goose upon the whole coast; and now since they have been so closely hunted they are rare and shy. The captain again and again expressed his astonishment at the amount of ice upon this northern coast; he had never seen it before north of Belle Isle, and from all accounts it has been the coldest season, with the most floe-ice, experienced for nearly forty years. The cod had not "struck in" at this point yet; a few capelin had been seen, but the fishery had not yet begun, while last year long before this date there was "plenty of fish."

This morning at Dumplin Harbor Mr. Mann caught a Chionobas differing very slightly from *C. semidea*, but in Mr. Scudder's opinion specifically different from that

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species, whose only habitat then known was the summit of Mt. Washington. It has since been observed in the Rocky Mountains. Here also we found the beach-pea (*Lathyrus maritimus*) just flowering.

July 18. We left Tub Island at 5 o'clock in the morning, and crossing the mouth of Hamilton Inlet were obliged to put into Sloop Harbor, twenty-five miles distant. The southwest wind freshened after dinner and blew off shore in the evening, but we were prevented from reaching Cape Webuc or Harrison by the ice, some of which floated about our vessel while at anchor. It was, however, waning; large cakes breaking into pieces with a report like a volley of firearms.

The northern shore of Groswater Bay—Hamilton or Ivuctoke Inlet, as it is variously called by the French, English, and Eskimo inhabitants—is in places very high and rugged, owing to the presence of trap dykes and ancient volcanic overflows capping the hills of gneiss. Huge dykes of the black rock ran in ruffled crests over the hills of pale, gneiss-like, huge black walls. "Black and White" is a notable island, conico-pyramidal in form, the western end of black trap rock, the eastern end composed of the pale gneiss common on this part of the coast. There is a similar but less conspicuous and lower island to the eastward. One dyke in particular, seen just before entering Sloop Harbor, was of basaltic columns in horizontal, quite regular, prisms. The highest hills appeared to be about seven or eight hundred feet in height, though this may be too high an estimate;* but owing to the great outbursts of black basalt capping the light

* Cape Harrison is estimated on the chart to be 1,065 feet high.

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Northern Coast of Hamilton Inlet, four Miles distant, bearing E.



Coast near Indian Harbor. *A*, Indian Harbor.



Coast hills, 500 to 800 feet high, on north side of Hamilton Inlet, bearing one mile north.



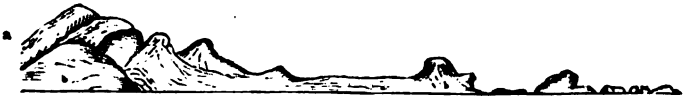
"White and Black" Island near Indian Harbor: *a*, black basalt; *b*, whitish gneiss.



Two parallel dikes, one forming the crest of the hill; one-half mile N. W.; *b*, *b*, white gneiss.



Three trap dikes; 1, the top of "Black and White" Island forming the western slope. *b*, *b*, white gneiss.



Northern shore of Hamilton Inlet, the extreme point to the right. *a*, basalt; *b*, white gneiss.

gneiss hills, and running in ridges or forming great splashes on the face of the hills, and sometimes entire hills, like craters, the hills are transformed from what

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would otherwise be quite tame elevations into high, bold, wild-looking peaks.

We went into Indian Harbor, which is an island from ten to fifteen miles from the mainland, forming the northern side of the entrance to Hamilton Inlet, to find a pilot for Cape Harrison, but none could be found. Near here is Ice Tickle, where the ice is usually detained later than elsewhere. Around one high head the murres are very abundant; it was evidently a favorite breeding-place for them; indeed all through the polar regions we imagine that these sea-fowl (murres, dovkies, sea-pigeons, and guillemots) are somewhat local, breeding about certain high headlands and inaccessible crags and cliffs; while the puffins select points where they may burrow and mine in the crumbling rock.

Around the head of this harbor, and especially well marked on the southwest side, is a noble beach at least 150 and most probably 200 feet high, lodged between two hills; its shingly surface was free from vegetation, and it looked as though the waves had receded from it but the night before; it was divided into two steps or terraces, the lowermost perhaps about 50 feet above the harbor. It was a constant source of regret that there was no means at hand of accurately measuring the height of these beaches: not an aneroid barometer was aboard, and



THE COAST BETWEEN CAPE HARRISON AND SLOOP HARBOR BEARING TEN MILES WEST.

I was quite unprepared for their accurate study. Indeed almost no attention has been given to the subject of ancient sea-margins in the United States, the terraces of

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the Great Lakes having been measured more accurately, since they are much more distinct than those on the coast. But on my return after this experience with Labrador raised beaches, it was easy to detect them in the vicinity of Salem, Lynn, Chelsea, and Boston, as well as on the Maine coast, though on the New England shores they are difficult to distinguish on account of the vegetable growth and forests which conceal them and prevent their ready recognition.

Huge bowlders of syenite, some oval and very round, were scattered about on shore, the smaller ones well rounded by the waves, while the bottom of the harbor is paved with cobble-stones, as we ascertained by dredging. The summits of the hills surrounding the harbor were formed of a pale, whitish, foliated syenite, with scattered specks of hornblende, while lower down on the sides the rock was a very dark gneiss, slightly porphyritic. I found here a dwarf willow new to me, the flowers purple, of nearly the same tint as the flowers of the cloud-berry. A species of field-mouse, which we failed to capture, was common here, its nests lined with mouse-colored fur.

The head of the harbor was said to be haunted by a ghost; we did not attempt to secure it or to lay it, but a more substantial, though still a fleeting treasure, was the huge, glacier-like snow-banks in the vicinity of the haunted spot, which were perhaps 20 feet thick, very hard on the surface, and much soiled: too hard, perhaps, to retain even the traces of the footprints of a Labrador spirit—whose tread, judging by the average Labradorian, must have been a firm one. One of the banks appeared to have slidden into the water, and from its edge a miniature berg had broken off and was floating

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away. So well marked were the ice-worn hills about us and elsewhere on this coast, that this snow-bank seemed but the dwarfed descendant of the great multitude of glaciers which had so recently filled the innumerable bays, fjords, and "tickles" of this coast. That this is not a mere fancy is shown by the following facts:

Mr. Lieber, the geologist of the U. S. Coast Survey Eclipse expedition of 1860, which went near Cape Chidley, the point we hoped to reach, speaks of walking over a snow-bank on the flanks of Mt. Bache, which "was a miniature glacier," while "a regular moraine was piled up along its edges." Captain Handy told me that on Savage Island, just north of Hudson's Strait, he saw in August ravines full of ice; and on Button Island as late as September 20 he found snow in the ravines. He called them glaciers, one patch of snow being five hundred feet long and two hundred feet broad. On Resolution Island, only one hundred and twenty miles north of Cape Chidley, he saw glaciers extending into the water, from which small icebergs fell into the sea; and Captain Hall describes the Grinnell glacier on Meta Incognita, which was two miles long, and discharged icebergs into the sea.

The next day the wind was against us, being north and very light. The day was warm and pleasant, but towards sundown cloudy, and as usual, as soon as the sun goes down it becomes cold and chilly. Though the floe-ice had now disappeared, a large number of bergs were to be seen outside slowly travelling down the coast, some of the smaller ones stranded a few miles from the shore. After this date, and beyond Cape Webuc, we were not troubled by the floe-ice; for weeks we had

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watched the progress south of this enormous expanse of floating ice, the stream being not less than a thousand miles long and over a hundred miles in breadth, more or less interrupted, of course, by "leads" and open water. It will be remembered that in former years the "floating-ice" theory prevailed, geologists almost universally believing that the polishing and grooving of the rocks and distribution of drift or diluvium were produced by floe-ice passing over the submerged land. This theory has been almost wholly abandoned, though south of the edge of the great continental glacier floating-ice may have transported morainal material southward and dropped it over the Middle and Southern States. It was therefore with much interest that I watched day after day the effects upon the coast of such a mass of ice as beset us for a period of nearly a month in summer. This immense body of floating-ice, as we have elsewhere stated,* seemed directly to produce but little alteration in the appearance of the rocks on the coast; in fact, the only immediate effects of waves and shore-ice action were observed in the Gulf of St. Lawrence at Little Mecatina Island, where there is no true arctic floe-ice. At Domino Harbor, as well as the harbor we were now in, the rocks had been disrupted, and the land descended in rock-terraces to the water's edge, and to a point at least two hundred and fifty feet below it. This singular appearance I attributed to the action of the ice-fort, or winter-ice, which has been well described by Dr. Kane. Now why should not the floe-ice while in motion along the shore have ground down the jagged and angular

* Observations on the Glacial Phenomena of Labrador and Maine, Memoirs of the Boston Society of Natural History, 1, pt. ii. Boston, 1867.

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points presented to the ice-current? If our slightly-built vessel could navigate these ice-laden waters, lie in harbors filled with ice, and not even have the paint worn off her hull, how could she have escaped the least of all the tremendous effects which are by some theorists attributed to floating ice? Moreover, no bowlders or gravel or mud were seen upon any of the cakes of floe-ice, nor on any of the bergs, many of which were flat-topped, like ordinary cakes of floe-ice. If they had been thus laden, they had dropped all burdens of this nature nearer their birthplace in Davis Strait, or the regions farther north. The icebergs in nearly every case, when closely observed, bore evidence of having been repeatedly overturned as they were borne along in the current, often with old water-lines presenting different angles to the present water-level. The floe-ice was hummocky, which is a strong proof of its having come from open straits in the polar regions, the cakes looking as if they had been frozen and refrozen, jammed together, and then piled atop of each other by currents and storms long before their advent upon this coast. The only discoloration noticed was probably caused by seals resting upon and soiling the surface. It should however be mentioned that one bowlder was said to have been seen by a member of our party upon an iceberg off Cape Webuc.

Finally, as we shall see farther on, the few ice-marks and grooves detected by myself and others on the Labrador coast show plainly that the country was once covered by land-ice, that it filled the bays and fjords, and moved into the sea at right angles to the course of the Labrador current, which flows parallel to the shore

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north of Belle Isle. Moreover, we would impress upon the mind of any lingering believer in the sole agency of floating-ice, that the surface of Greenland is covered with a glacier or rather a *mer-de-glace*, from which ice-streams press through the fjord into the sea, and that there are innumerable glaciers on the land-masses throughout the Arctic Ocean west of the Labrador peninsula, which are constantly grinding down, polishing, and grooving their rocky beds. Their work is perennial: that of the floe-ice is confined to the rocks at the shore of the sea, and there it virtually ends; the after effects of the floating-ice being so inconsiderable as not to rise to the dignity of a geological agency.

And so there was a ceaseless charm and interest in the problems in geology, physical geography, and biology which suggested themselves to us, whether clambering over the hill-tops, shuffling over the shingly pebbly beaches, now raised hundreds of feet above the sea, or chasing the arctic butterflies and moths, or dredging polar starpoles and the innumerable marine forms peopling these waters.

Life was monotonous enough to the others, as they felt bitterly disappointed at their failure to reach the higher Moravian stations and the promised headland of Chidley, from which we could look over Hudson's Strait and the waters of the Greenland seas; but so far as I was concerned, the opportunity to study the glacial marks, the raised beaches, the insects, and other life-forms, were so many crumbs of comfort to offset the general feeling of disappointment. It would be next to impossible to properly explore this coast in a single season without a steamer and small steam launches for work

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in the bays and fjords; thus independent of wind and ice, one could run outside and do in good weather deep-sea dredging, scrape the bottoms of the shallower bays and reaches, measure the raised beaches, geologize, botanize, and entomologize, and reach the better breeding-haunts of the water-fowl, and do something toward collecting the nests and eggs of land-birds. A well-equipped party in a steamer could, in four months spent on this coast, add vastly to what, on the whole, is perhaps the least-known portion of northern America. With the ample knowledge of polar life and nature we now possess as a basis of comparison, here is a most interesting field of exploration for our rising naturalists; it would at all events be an excellent training-school in physical geology and biology.

This day was entirely devoted to insect-hunting, and I found myself in a new world so far as the insect fauna was concerned, many truly polar species abounding. The spiders were thoroughly arctic, dark, dull-colored creatures, occasionally venturing out from their rètreats under the growth of curlew berry, or under stones; similar forms afterwards occurred to me in just such places on the summit of Mt. Washington, on Gray's and Pike's Peaks, showing that the Alpine summits of our mountains are but outliers, ærial islands, so to speak, detached zoögeographically from the frozen regions of the north.

On a steep, southerly exposure of the harbor, where a long glacis sloped toward an angular precipice, which overhung patches of vegetation, between the worn and polished naked rocks of the shore, we started up a few butterflies and moths. To my genuine surprise and de-

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light, there fluttered, half skipping and half-flying, over the lichened bowlders a butterfly I had never before seen, the high arctic bluet, (*Polyommatus franklinii*), heretofore only known to occur in the arctic world, and discovered by the naturalist of Franklin's voyage. I also netted an Argynnis, not hitherto discovered so far south; it was likewise a polar form.

The moths were all arctic species, and when at rest so harmonized in color with the lichens and other vegetation in which they nestled as to entirely deceive me. And yet what was the use of practising, even unconsciously to themselves, this deception? The answer was not far off—there was a shore-lark, or some such bird, flitting about and running over the rocks, busily searching for just such moths as these, and the only hope of safety for the insects from their sharp eyes was in their resemblance to the lichens.

The only tree seen here was the dwarf birch, *Betula nana;* those who have seen this Lilliputian tree on the summit of Mt. Washington will well remember its humble stature and little round leaves. No tree perhaps ever underwent greater modification by climate than did the ancestor of this species, and we cannot well doubt but that all these dwarf arctic trees and shrubs, so closely allied to their congeners in the north temperate zone, only escaped utter extinction by adapting themslvees to the extremes of their arctic surroundings. It will be remembered that the oak, gum, and tulip tree, the sassafras and maple, the cypress and sequoia, once flourished in what is now Greenland in growths as luxuriant as the forests of the Gulf States. When the ice-period was ushered in, and climate and other circum-

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stances changed the inhabitants of that tertiary polar land, of which Greenland and Spitzbergen are the remnants, they were either entirely effaced, or emigrated southward, becoming the ancestors of our American plants and animals, or, as in the case of a few forms, maintained their ground but changed into the present arctic animals and plants.

The afternoon was spent on the opposite side of the harbor, where there is an ancient sea-beach at least two hundred feet high, with four terraces, well defined by the windrows of pebbles left by the retreating waves—how many thousand years ago, a wise man would hardly dare to guess. On the two lower terraces the willows grew in irregular rounded patches; there were two species, one growing to a foot in height, their tops of the same length, as if clipped off with scissors; the other species was still more prone, creeping low in the reindeer moss and curlew-berry, or spreading vine-like over the rocks. Their catkins were being investigated by bumble-bees of two kinds, one or both truly polar.

During the 20th a cold northeast wind blew; the harbor was open to the wind and sea, so that our vessel was pitching through the livelong day, making everybody's headache, and sending nearly all to their bunks to sleep through the discomfort. No ice, however, was brought in by the wind, which showed that the coast was clear whenever the wind should be fair. The icebergs, however, are seen marching ceaselessly down the coast at a distance of ten or fifteen miles out at sea.

The wind and swell did not prevent the fishermen from seining for capelin, so essential as bait in fishing for cod. When the seine is hauled the fish are

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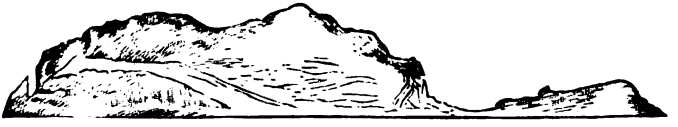
bailed out with scoop-nets. At such times these active little fish throw off from their gleaming sides all the colors of the rainbow. The cod were seen through the transparent water hovering about the outskirts of the school, snapping at any which became separated from their fellows, and following them so near the boats that the men would drive them away with their boat-hooks. After capturing one school, they would row about near shore on the watch for another. The seine-boats differ from others in being narrow and long, from twenty-five to twenty-seven feet in length.

We here saw specimens of a variety of cod, called "duffy," which may be the same as Professor Wyman's "bull-dog cod." Its head is blunter, the under-jaw is shorter, while the fish is darker than ordinary cod; the fishermen pronounce them "no good;" it is possible that such as are taken are simply deformed individuals of the common species. We found, however, that at Hopedale these fish were comparatively common, and taken with the gig by the Eskimo.

We left Sloop Harbor early in the morning of the 21st with a light easterly breeze, but we made only five or six miles, playing about the icebergs nearly half the day. The gigantic steps or terraces carved by the shore-ice out of the lofty rocky shore of the islands about here were very remarkable, especially when we saw them in sections. We counted some thirty bergs to-day. While Mr. Bradford was industriously painting them, a party of us went in a boat to Tinker Island, a lofty rock far out to sea, its sides sheer precipices, whose bases were washed by the ceaseless Atlantic swell; a yawning chasm nearly divides the island in

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two, and by entering the fissure we could effect a landing, and climb up to the heights above. The rock and all its belongings, with the sea-fowls flying about or sitting by thousands on the projecting shelves, reminded us of the pictures, so familiar in childhood, of similar scenes in the Orkney and Shetland Islands. The tinkers and murres breeding here were in immense numbers, the females on the rock shelves, and their consorts resting on the waves, or flying overhead to the leeward. This island was situated several miles from



TINKER ISLAND, BEARING TWO TO THREE MILES WEST.

land, remote from other islands, and consisted of a hard, coarse-grained granite, the feldspar predominating and of two kinds—one flesh-colored orthoclase, the other smoky labradorite; it was weathered into regular steps and shelves, and huge blocks had been detached by the frost, the angles having been rounded by the weather; near the water's edge the waves had worn it into smooth declivities. The east wind blew chill from the direction of the ice-pack, which could be seen a few miles off enclosing a number of large bergs. The pools of water on the higher portions of the island were inhabited by case-worms, and it was evident, by the feathers at the bottom, that the murres used them as wash-basins. In a deep, narrow chink between the rocks I found a murre's egg, while the tunnels made by the puffins wound through the scanty soil. I started up a blue fox, which was running toward me with a murre's egg in his mouth;

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on my throwing a stone at him he dropped his egg and scampered off. I hallooed for nearly ten minutes for some one with a gun to come and shoot him, and kept him in sight; with more of curiosity than fear he would stop at intervals to look at me, keeping a safe distance off and barking, until he disappeared. Soon Mr. Wasson came up; we pursued finding him on the other side of the island with another egg in his mouth. Mr. Wasson gave him his death-wound, though he ran some distance with the egg between his teeth before he dropped dead. His flanks and belly were white, the rest of a slate-blue color, his legs very long, and tail long though not very bushy; the more remarkable features were his short, rounded ears, as if cropped. Mr. Wasson also shot a Labradorian falcon, which Professor Baird afterward wrote him he thought might be an immature stage of *Falco candicans*. On this exposed spot the cloud-berry had nearly done flowering; the cochlearia, growing from two to six inches high, was in bloom, while a pretty, gentian-like flower was found here which was not observed elsewhere.

We laid to all the short night, as Mr. Bradford wanted to paint icebergs, getting up at three the next morning to secure some noble ones. Then we soon ran down and doubled Cape Webuc or Harrison, which is a lofty gneiss headland, faced with syenite, its northern face seamed with vertical trap dykes with an N.E. and S.W. direction. Ragged Island now bears N.N.W., and, as its name implies, is exceedingly rough and jagged, and evidently composed of syenite, as are nearly all these headlands, being probably outflows of crystalline rocks capping the Laurentian gneiss. We next came

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in sight of high rounded mountains near the shore, which appear to be not less than twelve hundred feet high; far back of them were several peaks, which rose above a mass of clouds partly enveloping them, and seemed to rise five or six thousand feet into the heavens. The highest peak is Mt. Misery, and Captain French



MOUNT MISERY, OR ALLAGAIGAI, 2,170 FEET, DUE W. OF CAPE HARRISON BY CHART.

says that in clear weather the group seems very near when viewed from the southern side of Hamilton Inlet. I do not doubt but that this peak, which was obscured by clouds for two days after, was not less than two thousand feet high.* The view of this mountain, so transformed by the clouds hovering just below its peak, was the grandest coast view of the voyage.

Towards the end of the day we ran into Stag Bay, some twenty miles north of Cape Harrison, after a pilot. Dredging in this harbor at the depth of ten fathoms was not very fruitful, except in some fine varieties or species of the very variable genus, *Astarte*, including *A. banksii* and *A. compressa*, and a Gammarus new to me. The harbors on the Atlantic coast of Labrador have rather barren rocky bottoms; sea-weeds are scanty, the shores are so steep; and there are so few large streams emptying into the bays, that no sediments are carried down from the land to form muddy or sandy bottoms. If the floating-ice theory were true, we should have expected

* My guess I found to be a good one, as I find Mt. Misery is put down in the chart under the name of Allagaivaivik, with a height of 2,170 feet.

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to find plenty of sediments borne from the polar seas: hence the absence of such submarine deposits in these protected harbors, as well as out to sea, so far as we could learn,—which, however, are choked with ice during June and July,—is a significant fact. When we lay outside we were never becalmed, or saw the time when we could get a chance to dredge over the vessel's side: and as we have already said, such work can only be thoroughly done by a well-equipped steamer.

Since leaving the Strait of Belle Isle there has been little chance of collecting the littoral species; indeed, that broad stretch of shore and flats between high and low water mark, which is so characteristic of the Nova Scotia and New England shores, is here well-nigh abolished; the tides rise and fall not much over four, or at the most five or six feet, while the rocks plunge directly into the sea, and there is only a narrow border of fucus hanging sparsely from the rocks, between tide-marks, with little life,—indeed, the only species I noticed being the common shore-snail, *Littorina rudis*, and the little amphipod crustacean, *Gammarus mutatus*. The same poverty of littoral animals obtains on the Greenland shores, and it may be thus readily understood why the starving members of the Greeley party could find nothing to eat along shore but scattered sea-weed and "shrimps," the latter undoubtedly the *Gammarus mutatus*, which is common on the shores of the polar seas. The best spots to dredge are the patches of shelly bottoms situated in eddies at the inner end of a "tickle" leading out from a deep harbor, where the tides and currents have no power; for where the dead shells are gathered, the living ones are mixed with them.

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The whole of the 23d, which was cloudy and rainy, was spent in search of a pilot for Hopedale. A boat's crew, myself included, rowed some seven or eight miles to Roger's Harbor, where in a quiet basin connected with the sea by two narrow "tickles," were about fifteen vessels—schooners and barks. We went aboard one, and it was indescribably filthy, above and below; from the cabin arose a dreadful stench; the women aboard, with one exception, harmonized in point of personal appearance with their surroundings. We asked for a little saleratus, and were kindly given some made from the spruce.

This island is of syenite, its feldspar flesh-colored, and the shore is in its scenic features like that of the rocks at Nahant or Mt. Desert, with a few small beaches, the slopes leading down to them of an intense green. The cod had not yet "put in." Last year on the 26th they took a hundred quintals the first day they appeared. The fishermen talk discouragingly of this year's prospects, and seem to be pushing "up to the nor'ard" more rapidly than usual. In fact, for three years Newfoundland fishermen have gone for fish beyond the Moravian settlement of Nain. Add to the lack of codfish, the failure of the spring's "swile," "sile," or seal fishery, and they were doomed to fare pretty hard that winter.

We found we had not gone far enough to find Tom Bloomfield,* the man we were in search of, but were near the house of Cole, a half-breed, part Englishman and part Eskimo, with an Eskimo wife and half-breed

* See 21 on the map of Eskimo Bay. Cole's house is 22.

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children. The captain rowed over, and by the merest good luck found young Cole, who agreed to pilot our vessel up to Strawberry Harbor, twenty-five miles distant, where there were said to be two Eskimos who would be glad to show us the way from there to Hopedale, since they were desirous of going there, but had no boat, and would otherwise have to wait until the autumn.

Never shall I forget the grandeur, the utter desolation, and the purple glories of the sky and shore as we rowed back that evening down Stag Bay, which is a wide sound, bordered with lofty terraced hills, the last rays of the setting sun lighting up the heights of the Webuc Range, as we may term it, up whose slopes gradually rose the purplish tints ushering in the darker shades of the twilight.

Young Cole came aboard the vessel in the evening after we had returned, in a large jack, which was decked over; it had a small punt on it, beside his wife and child, upon whom he depends to help him row back should we be fortunate enough to reach Strawberry Harbor by noon.

It seems that there were formerly a few Eskimos living in this region, but they have died off rapidly within a few years past. They had gone with the eiders, the geese, and the sea-fowl, the walrus and the fish; their game and their race had been banished, like them, to the arctic regions. Our pilot, Captain French, said that there was now but one Eskimo where there used to be twenty. Their disappearance here seems due partly to natural causes, to the absence of abundant game and birds, and partly to contact with the civilization of this

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coast, unless their close winter houses induce chest troubles: any other diseases are unknown. But whatever may have been the cause, they are rapidly melting away, disappearing by entire families. They have probably faded away before the Nascopi Indians, who are better armed, and their permanence at Hopedale and northward may be due to the absence of the red Indians from that part of the coast. But the Innuit or Eskimo is a doomed race. Whether they are the remnants of the palæolithic race (which good authorities doubt) and formerly ranged over northern Europe during the earlier stone age, and extended in America as far south as the border of the great continential glaciers, and were a few centuries ago driven northward by the red Indians, is a problem; but probably long before the red man entirely disappears, the Eskimo will be represented by but a few thousands in the high northern regions.

Cole was not much inclined to leave home, as the salmon were just about striking in; and, as he said, they only remained three or four days, and he might lose them, since only his father, who, as we understood, also had an Eskimo wife, would have to attend to the nets single, or rather—as his better Eskimo half would work man-fashion with him—double-handed.

At the mouth of the stream where they lived were several huts tenanted by salmon fishers. About them lounged a number of full-blooded Eskimo dogs, which are quite superfluous in summer, but useful in winter, when they can draw sledges at the rate of a hundred miles a day should the travelling be good.

The early morning of the 24th of July found us with our pilot aboard ready to start for Strawberry Harbor; but

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there was a dead calm. However, at about 10 o'clock a north wind sprang up, so that we put to sea and sailed until within eight miles of Strawberry Harbor, when it blew hard and became too thick to run farther; so we put back three miles and ran under a lee-shore, where the northeast wind blew a cold, fierce gale, with fog and rain. Our vessel dragged her anchor, which was down at a depth of twenty fathoms, so that the larger one was dropped down, making ninety fathoms of cable to haul in on the morrow.

Our pilot was a very intelligent half-breed who could read and write, his wife also a half-breed Eskimo. He said that the ice had only cleared off the previous week, and up to that time since March they have steadily had in Stag Bay cold easterly and northeasterly winds. Near where we anchored was Cole's brother, who had built himself a new house. Yesterday he took six and to-day eight salmon in his nets, which were stretched across the mouth of a little brook. He shot eleven deer during the winter, one of them sufficient to supply the family with food for two weeks. They had plenty of deer and other game when too late in the season for obtaining fur; he predicted an abundant supply of game during the coming autumn. We will give his statement regarding the varieties of foxes here, which may be taken for what it is worth. There are four varieties of foxes which he said crossed among themselves, i.e., the red and white, which are the two most common ones; then the patch fox, which is blue with red on the rump, and the black fox. Whether the red and white or arctic fox interbreed we do not know; the blue fox is undoubtedly the white fox in its summer pelage; the short ears and long tail

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sufficiently distinguish the arctic fox and its varieties from the red or Virginian species. They had never seen the walrus about here. The spruce-trees up in the interior are quite large, Cole said, some of them reaching a diameter of thirty inches at the butt; but the birches are small, none large enough to make canoes.

Of the red Indians of the interior but little could be learned. The reader will find the best account of them in Hind's Labrador, while the subjoined extract will convey some idea of the Labrador Indians as they were.*

* "As for the interior parts of the Labrodore, it is wholy occupied by the northern Indians before taken notice of, who live and depend mostly on fish and deers flesh; woolves, foxes and otters, affords cloathing; and as these are to be had by traps, and guns, and other contrivances, their necessities nor ambition dont prompt them to desire many things from us: our twine, fish-hooks, ice chizzels, ketles, and small wares, make up the ultimate of their wants. As for guns, powder, and shott, their are numbers of them don't know their use. The moulted fowls at proper seasons, and what else may be had with the bow and arrow, procure enough for change of dyett, who live in great plenty otherwise, do reduce these peoples wants into a narrow compass.

"The skirts and borders of Labrodore are hilly and mountainous on every side (a small part excepted); but the interior parts is covered with lakes and morassis to a wide extent, which affords an easy communication into all our principal rivers; but as above, these people have their food and rayment on so easy terms, that hardly one in twenty have ever taken the trouble to go to ours, or any of the French setlements. Indolence and idleness has a good share in this indifference: but surely tis a mark of great wisdom in them.

"However, those few that has frequented the setlements, begin to like our commodities better; their women like our nicknacks and guegaws, and the men begin to love brandy, bread, and tobacco, so that a little address and management will bring these happy drones out of this profound lethargy. You'll say these people would, from their manner of life, have increased faster than the other indians; but the reason I gave before has, in some measure, prevented them; and now it will be a good motive to apply themselves in earnest to the use and defence of the gun, who, by the aid and convenience of our setlement at Richmond Fort, will be enabled to keep in a body, and repell force by force, without being divided, or under a necessity to travell a great distance from their familys, by having all those things brought to their own doors.

"All the hilly and mountainous parts of Labrodore are occupied by the Usquemews, from the bay of Saint Lawrence on the southern, eastern, and

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They are called Montaignais by the French Canadians, Mountaineers by the English, but referred to the Nascopi tribe by the more intelligent of the latter. The tribe is a branch of the Algonkin stock, and is the only tribe known to inhabit the Labrador peninsula. They are more commonly met with at Rigolet, the trading port of the Hudson Bay Company up the Hamilton Inlet (Aivektok Bay); they are also described by Hind, who encountered them at the mouth of the Moisie River, which empties into the Gulf of St. Lawrence. Along this part of the coast they are rapidly diminishing: last winter many of them starved to death—several hundred, according to Cole's statement.* It now appeared that the large fire, the smoke of which we saw before reaching Dumplin Harbor, was from an area of over forty square miles situated back of where we were lying at anchor, and it burnt up some of the traps belonging to

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northern borders, and all along the east main to 56° and 57° latitude, and on all the islands adjacent, who are the seamen and fishermen on salt waters, as those are on inland lakes and fresh water rivers. Both one and other getts great quantities of deer; but whales, seels, and sea-horses, are the principle support of the Usquemews; wether these retreat and retire to any distance from the sea-side uppon the approach of winter, or are wearid with their long summer day, and creep into their winters cave to rest, this is certain, we never saw but once or twice a single Usquemew in many years experience in the homeward bound passage, altho we have been detained by contrary winds at all their haunts.

"The interior parts of Labrodore affords good shelter, and woods plenty for the northern Indians, who dress their victuals as we do; and dry'd fish supply the want of bread; they are very nasty in their persons, as all the Indians are; but not offensive in their filth, as the Usquemews." (Coat's Geography of Hudson's Bay, pp. 88–90.)

* "Returns of the Hudson Bay Company show that about 4,000 Indians frequent the company's posts throughout the whole of Labrador; and this account probably includes nearly their whole strength; nineteen twentieths of them are nominally Roman Catholics." (Encyclopædia Brittanica, article Labrador.) Undoubtedly since this count was made their number has considerably diminished.

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Cole's brother. The fire was ascribed to Indians, who probably set the woods in a blaze to drive out the game; it was preceded by two unusually warm and dry days, at the time when the wind turned westerly and we were let out from our prison at Square Island.

The icebergs were still neighborly, two large ones in the offing, one like a church steeple, the body submerged beneath the waves, while the other suggested the form of a huge squirrel sitting on his haunches with his tail over his back. According to Cole the snow and ice clears off from the coast at this point about the 20th of June; at least that is the date when he leaves his winter house for his residence on shore; the first of October, when the snow begins to fall, he moves back into the interior.

The early part of the next day it stormed, blowing almost a gale from the north, with heavy rain; we still held on to our rather exposed anchorage under a high point of land; not the least bight or indentation near at hand for harborage. In the afternoon the weather moderating, we got under way, and reached Strawberry Harbor at ten o'clock in the evening. On our way here we were boarded by an Eskimo in his kayak, who had been living in this bay during the summer. We first caught sight of the little craft two or three miles astern. It looked as it came up, bows on, like a large puffin sitting on the waves; soon we could see the paddle describing a trajectory such as the wings of a puffin might make, and eventually we could recognize the human apart from the kayak, though an Eskimo seems an integral portion of his kayak,—one as human as the other. We throw over a rope, the kayak disgorges the Eskimo, the latter

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deftly climbs up over the rail hand-over-hand, and then we take aboard the kayak.

Whether the little box of a harbor we swung in was called Strawberry* because it was but little larger than that berry, history does not record; but it was the queerest of the queer harbors we had entered, and by this time the monotony of leaving one harbor in the morning and entering its counterfeit presentment the same evening had been a matter of remark by the grumblers aboard. There was not room enough to swing by our cable, so we made fast to the rocks ashore, which rose in cliffs reaching nearly to our topmasts. Another vessel shared these narrow quarters with us. She had had tolerably good luck in fishing, her hole being packed two or three feet deep with codfish.

Deep and seemingly inaccessible to outside life as Strawberry Harbor promised to be, the next day, which was nearly calm and sunny, with a little breeze from the east, the mosquitoes, swarming from land and peering over into our den, swooped down upon us and made life miserable. Ashore with my insect-net, they fairly drove me off the hunting-ground, which proved to be richer in arctic insect life than any yet experienced.

So with the plants, showing that this spot was warmer and more protected than any harbor we had visited for the past two weeks. In the gulches and ravines the mountain-ash, alder, and willows grew to the enormous height of three feet; the white spruce-trees were perhaps twenty-five feet high and one foot in diameter near the ground. This species of Abies, called in Maine the "cat"

* This harbor is very near Ford's Bight or Nisbet's Harbor, and about ten miles from Anderson's house, 16 on the map of Eskimo Bay.

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or "skunk spruce," from its peculiar odor, is a more hardy tree than the black spruce and grows farther north. We have seen it growing luxuriously in Aroostook County, Maine, but it is rarely found farther south than Mt. Desert. Violets were in bloom, and one or two were new to me; *Ledum palustre* was now out of flower, while the Labrador tea (*Ledum latifolium*) was still in blossom, as were the bunch-berry, the mountain-trident, and the golden-thread; *Kalmia glauca* was nearly done flowering, and the green fruit of the curlew-berry was of full size; evidently the short Labrador summer of six weeks had come.

The rocks about us were syenitic, with numerous thin trap dykes, both vertical and horizontal; some of them had weathered away, leaving deep vertical fissures; where the horizontal dykes had disappeared, great blocks of syenite had fallen down, giving a dismantled appearance to the shore. The south side of the harbor ran in rock-terraced heights to an elevation of nearly five hundred feet, the huge rocky shelves falling away seaward as if laid and smoothed with cyclopean hands. Climbing about over these hills was almost impossible; streams rushed foaming down the ravines, some in sight, others only known by their rumbling, stifled roar under the bowlders concealing their bed.

We learned that some Eskimos were spending the summer on an island hard by, and we tried to get one to pilot us to Hopedale, but were unsuccessful. Landing on another flat islet near by, where this or some other Eskimo, with perhaps his family, had been summering in his tent or tepic of seal-skins, as evidenced by the circle of stones used to weigh down the bottom of

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the tepic; the marks of his temporary sojourn were indubitable, as witnessed by the stones which had been used to prop up his tent, the feathers and bones of sea-fowl he had shot or snared, and by the scattered seal bones and skins and other unmistakable signs of Eskimo occupancy and of Eskimo personal uncleanliness.

July 27th and 28th we had a severe gale from the north, with snow and rain. All through the day the poor women on the other vessel had to do their cooking on deck without shelter. On the 28th the thermometer went down to 34° F., and we had nearly two inches of snow on our deck, while on the hills above us were drifts a foot deep which lasted for a day or two, as measured by Mr. Willis, who explored on the following day the heights above us, and reported tracks of foxes in the snow. Two deer were also seen by some fishermen.

On the 29th it cleared off, and at sunset the wind changed to the west. At last we picked up an Eskimo pilot for Hopedale. He had been partly educated, and was living with a Norwegian who had been on the coast for eleven years, during seven of which he was in the employ of the Hudson Bay Company, his pay being fifty dollars a year. He brought us two salmon of a species I had not before seen, and which proved to be *Salmo immaculatus* of Storer.

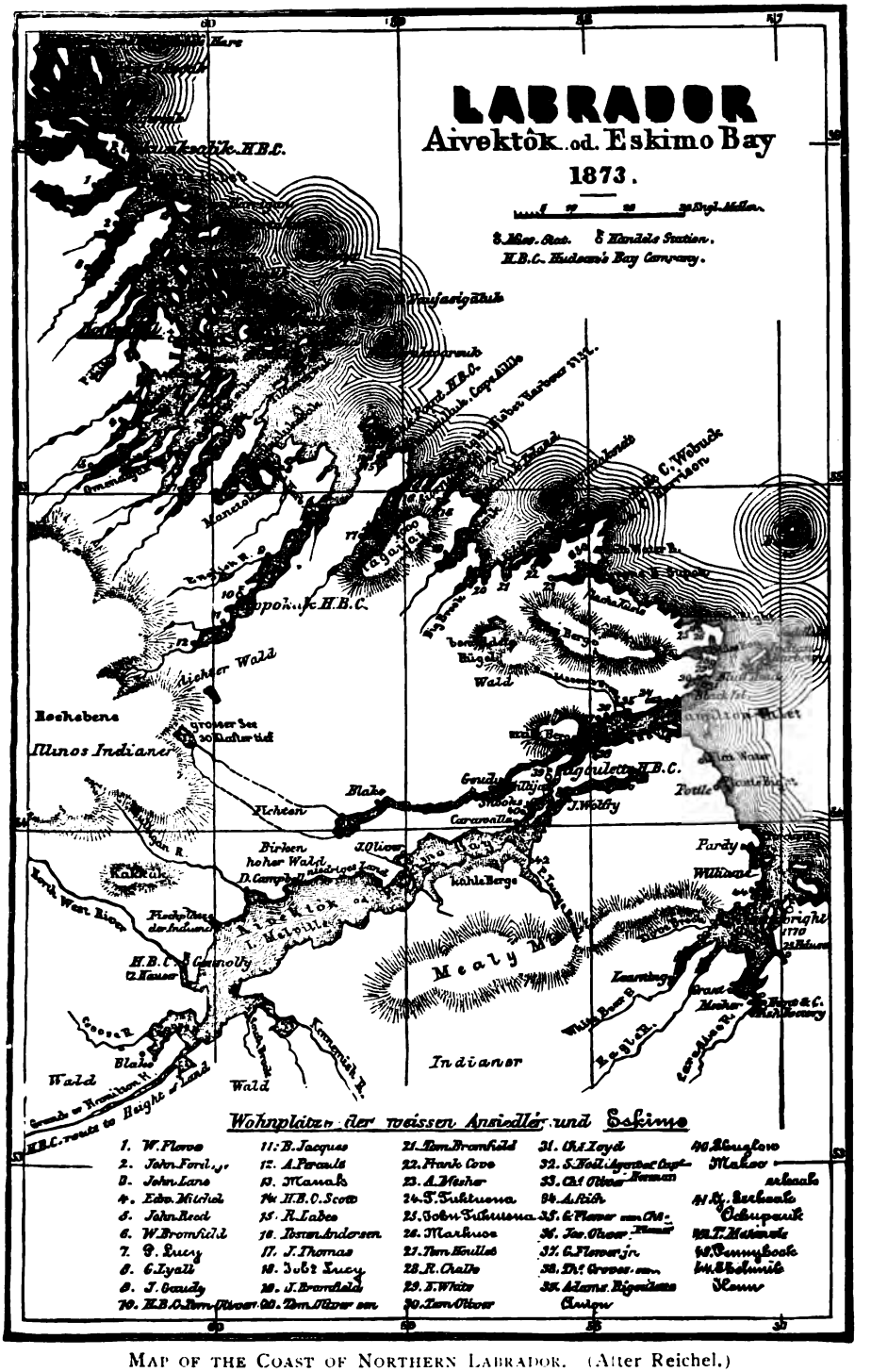
He nets more of these, which he calls salmon trout, than of the true salmon, fishing for them with a twenty-foot net. The salmon come in usually on the 22d of July, and continue to run up the streams until about the 20th of August. The "salmon trout" is found nearer shore, while the large true salmon is more abundant at the mouth of the bay than ten miles inland, where our

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Norwegian friend lived. He heard to-day, as he remarked to us, a wolf howling, and supposed it had killed a deer, as "after feeding upon one they usually begin to howl." During the winter he shot fifteen deer, enough for the winter's supply of fresh meat. We found here fresh traces of the polar bear, an Englishman, named Tom Oliver, having shot a small one last winter.

Part of this day was spent ashore, and on the side of a deep ravine we recognized an old acquaintance in a low white golden-rod like a familiar White Mountain species. The star-flower (*Trientalis americana*), also a dwarfed yarrow (*Millefolium*) and an Andromeda were seen to-day in addition to the flowers we picked before the storm; also a dandelion-like flower. More land shells (including the slug, *Limax agrestis*) were found here than at any other point we visited; they occurred under spruce bark and chips in the damp verdure: all of them (*Pupa hoppii*, *Helix fabricii*, and *Vitrina angelicæ*) were Greenland shells, never before found south of that arctic land, and this fact bears witness to the interesting intermingling of Greenland life, animal and plant, with the Canadian or boreal forms indigenous in the forest-clad interior. There are in Labrador two climates, the arctic on the coast, the boreal or north-temperate in the interior. The Greenland and arctic forms occurring on the coast are the remnants of the glacial or arctic flora which were formerly spread over the entire territory of British America, New England, and the northern central United States during the supremacy of the ice, and which were, so to speak, pushed out to sea by the migration northward of the temperate forms, only retaining their hold on the treeless and exposed islands and head-

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MAP OF THE COAST OF NORTHERN LABRADOR. (After Reichel.)

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lands of this coast, which in nearly all respects are arctic and circumpolar, though Hopedale is in the latitude of Dublin.

Another Greenland shell, a little fresh-water bivalve (*Pisidium steenbuchii*) not before known to live south of Greenland, was common in the pools, from which were arising caddis-flies and an Ephemera. A worker bumble-bee was also seen here for the first time, notwithstanding the cold weather of the past few days.

Here were again to be observed the signs of the former depression of land which marked the height of the Leda-clay epoch (the Champlain epoch of the books); beaches at least 100 feet high, with two terraces, the lower one from fifteen to twenty feet above the sea-level. The afternoon of July 30th saw us safe in the harbor of Hopedale. A fresh, fair, west wind blowing all night let us out of our snug little haven at Strawberry. Our pilot simply knew the way to Hopedale, and some of the more dangerous rocks along our course. The wind was so fresh that our cautious captain took two reefs in the mainsail, but it only blew strongly out of the bay, being an off-shore wind, and the force of the breeze diminished sensibly as we went out to sea. The mountains and hills around our harbor and perhaps for a distance of ten miles northward, some of them 800 and 1,000 feet high, were spotted with snow, the remnants of the past storm. As we approached within twenty miles of Hopedale, the outer islands at the mouth of Kippokok Bay were seen to be more or less hummocky, some of them high and rounded, evidently composed of the labradoritic syenite, while the mainland at the head of the bays was of Laurentian gneiss. Still as we advance

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northward the whole country, or at least the coast, gradually rises higher above the sea, which made me more than ever anxious to see how it culminated in the wild, crater-shaped, snow-streaked lofty mountains near Cape Chidley; but it was not to be our good fortune to reach that promised land.

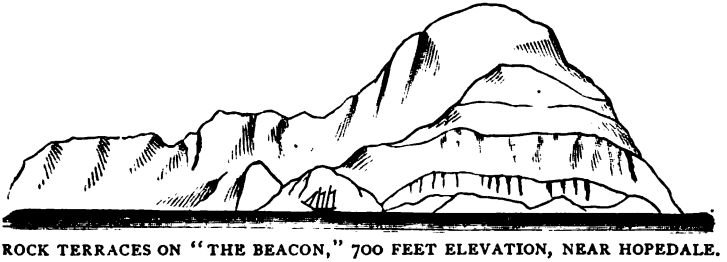
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CHAPTER IX.

A SUMMER'S CRUISE TO NORTHERN LABRADOR.

IV. HOPEDALE AND THE ESKIMO.

ABOUT an hour before we reached Hopedale, we passed a high sugar-loaf-shaped island, "The Beacon," with four well-marked terraces carved by the weather or shore-ice when the sea stood at different levels in the ages gone by, as the land halted in its upward rise. This



ROCK TERRACES ON "THE BEACON," 700 FEET ELEVATION, NEAR HOPEDALE.

was the landmark for the Moravian vessels from London, and by boiling water on the summit it had been ascertained to rise 700 feet above the sea. The rock was evidently that variety of syenite containing labradorite and green hornblende. In the interior a few miles distant was to be seen a high elevation, broad and massive at the base, but conical or nipple-shaped at the summit, and rising perhaps 1,500 feet above the sea.

As we entered, on a Saturday afternoon, the harbor of Hopedale, which is situated at the head of a deep,

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broad bay or sound, we nearly overhauled the Moravian supply ship "Harmony," just out from London. She was a bark of 300 American tons, very neatly kept, thoroughly well-appointed, and well-officered and manned, her chief officer, Captain Linklater, a Scotchman. As she approached the harbor and before we discovered the mission building ashore, she fired a salute from two nine-pounders, at the same time sending her flag up to half-mast: both announcing her arrival and signalling disaster—the death in London of Rev. Mr. Latrobe, Secretary of the Society of the United Brethren. A salute from a small gun near a flagstaff on the rocks not far from the mission, and an irregular volley from the fowling-pieces of the Eskimos answered; then a dory and a kayak put off from shore, followed by a heavy, clumsy boat with a square block tiller, which bore the three missionaries, clad in seal-skin frocks with capotes, who greeted the others aboard with a kiss on each cheek. The boat's flag was also at half-mast, as the oldest missionary, Superintendent Kruth, had died at Hopedale but a few days previous. The "Harmony" had brought over besides a missionary who had been absent for two years, the agent or supercargo, Herr Lintner, who had been educated as a civil engineer, and was the son of the owner of the vessel; he visits the three mission stations, and reports to the Society at home as to their condition and progress.*

* This was the only vessel which visited Hopedale while we were there. Since that date this part of the coast has been visited by fishermen from Newfoundland and Nova Scotia, attracted northward by the greater abundance of codfish. Dewitz states that up to the year 1879 nearly 2,200 vessels had visited Hopedale, from 500 to 600 annually reaching the port, while in the year 1879 800 vessels touched at Hopedale, and on one morning 72 vessels lay in Hopedale Bay.

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Meanwhile we were boarded by a large delegation of the squat, square-faced aboriginals ashore, full of curiosity and interest, quite ready to accept any offering from our dinner-table, or even the scullion's waste-pail, and examining our spars and deck with approving glances. We returned the visit, and it may be confessed that we fully reciprocated their interest in our surroundings when we inspected their own.

There are six Moravian settlements in Labrador, the oldest being Nain, which was founded in 1771 ; Okkak was founded in 1776; Hopedale in 1782; Hebron and Zoar in 1830. Hopedale is situated in lat. 55° 25′, Nain in lat. 56° 25′, Okkak in lat 57° 33′, and Hebron in lat. 58° 50′. At these stations there were in all, in 1860, twenty missionaries and about 1,400 Eskimos. Rama was founded a year or two after our visit.

The new science of anthropology was not so generally cultivated in 1864 as now, and we took no notes of the height of the Eskimos at Hopedale and elsewhere ; but in "Science" for July 29, 1887, we find the following statements by Mr. W. A. Ashe as to the mean height of the Eskimo at North Bluff on Hudson Strait, taken from measurements of "60 families," the exact number of persons measured not being stated. The men averaged 5 feet, 3.9 inches, and the women approximately 5 feet, in height.

And here it may be said that the condition of the women, whether the effect of their semi-civilization and Christianization or not, was certainly not that of subjection, but of normal equality. They were certainly sharper at a bargain than their husbands, and within doors, at least, appeared to be mistresses of the mansion.

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The women's dress differs from that of the men in the long tail to their jacket-like garment; some wore an old calico dress-skirt over the original Eskimo dress,—a thin veneer of civilization typical perhaps of the education they had been receiving for the past few generations, which was not so thorough-going as not to leave external traces at least of their savage antecedents. But may this not be said of all of us? For only a few centuries ago our ancestors were in a state of semi-barbarism, and the Anglo-Saxon race can date back to Neolithic Celts and bronze-using Aryan barbarians. However this may be, the Eskimos at Hopedale were a well-bred, kindly, intelligent, scrupulously honest folk, whereas their ancestors before the establishment of the Moravian missionaries on this coast were treacherous, crafty, and murderous. To be shipwrecked on this inhospitable coast was esteemed a lesser evil than to fall into the hands of wandering bands of Labrador Eskimos. The natives have evidently been well cared for by the missionaries, kept from starvation in the winter, and their lives have been made nobler and better. Even in an Eskimo tepic life has been proved to be worth living. Fishermen and cruisers are (1864) not welcomed here, and it was not until a day or two had elapsed and the object of our expedition made known that we were cordially welcomed.

There were four missionaries at Hopedale: Brothers Shutt, Kreuchmer, Vollpracht, and Samuel Weiz, the latter, who died in 1888, a good botanist and interested in the zoology of the coast. They were now living with their families under one roof in the new mission house—a red-roofed yellow building of wood, of two stories and a half, a large, convenient, warm house—

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A Full-blooded Eskimo Family at Hopedale, Labrador, 1864.
(From a photograph by Bradford.)

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there being seven buildings in all, including the unfinished new chapel; at a distance from the others was a small powder-house. The servants in and about the station were Eskimo, neat, cleanly, and intelligent. There was plenty of lumber, judging by a pile of spruce-logs, which were about fifty feet long and twenty inches in thickness at the butt.*

We were also told that the Eskimos had built and manned a schooner of fifty tons. The mission is in part a trading-post, but at present is paying only half its expenses; the missionaries dealing in furs and curiosities, which they sell in London. Mr. Weiz kindly gave me a list of the plants and vertebrate animals of Labrador, accompanied with notes, and his herbarium was very complete in the plants of Okkak, which he said was warmer, more protected, and had a more luxuriant flora

* The northern limit of trees on the Labrador coast appears from the statements of L. T. Reichel to be not far north of Hebron, as he says that while the extreme northern part of the coast is treeless, the bays south of Hebron are well wooded with spruce and larches, and south of this point with birches. Although situated considerably more to the south than Greenland, the winter is longer and the cold greater than in Greenland, since the southern extremity of Greenland is warmed by a branch of the Gulf Stream, while the winter climate of the Labrador coast is lowered by the floating ice borne by the Labrador current from Baffin's Bay. In Greenland the water becomes open in April, while in Labrador the bays are not free from ice till the first of July. On the other hand, the summer months are considerably warmer than in Greenland, and hence there is a forest growth, since the interior of Greenland is buried in ice. In Dewitz's pamphlet it is stated that in the deep bays between Zoar and Hopedale birches occur, also willows, stunted bushes of the mountain-ash, and alders, until south of Hopedale the vegetation passes into the forest flora of Canada. But we observed that the outer islands are nearly bare from Cape Harrison to Hopedale, the shrubs and stunted trees mentioned only growing in protected valleys. Dewitz adds that there are remnants of forests on the coast, but that the missionaries have been unable to plant forests, and they think that the existing forest growth owes its origin to an earlier, warmer period.

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than Hopedale. Mr. Vollpracht told me that a large fresh-water snail (*Limnæa*, near *elodes*) was abundant in a lake at Okkak. The collection of birds' eggs was a good one, and they also had skulls of the polar and black bears and of seals, which they sold to us. I also purchased a valuable collection of insects, principally butterflies and moths, obtained at Okkak. We visited the rather large cemetery, well laid out and fenced in, situated in a level spot where the soil was deeper than elsewhere: at one end were the graves of the missionaries, over which memorial slabs were laid; a large mound marked the last resting-place of Superintendent Kruth, while among the others was an infant's grave; at the opposite end of the yard were the short graves of the Eskimos.

There were six little gardens, each perhaps belonging to a separate family. They were laid out like those in the fatherland, with clumps of spruce and larches, embracing a summer-house, a rustic seat, and a grass-plot. There were also rows of hot-beds, where they rear lettuce from plants raised in the house, yielding them salad in May. Turnips were well forward, onions were in bud, currant bushes two feet high were in blossom, as well as potatoes, which were six inches high, and the rhubarb was quite luxuriant in its growth, its flowers having been open for some time.

The Eskimos were ready enough to traffic, though slow at first to bring out their wares, which consisted of birds' eggs, principally those of robins and murres, models of kayaks and oomiaks, as well as sleds in bone and seal-skin. From one of them, named Caspar, a lame boy who had lived ten years in Hamilton Inlet

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and knew a little English, I was told that a narwhale was seen many years ago on this coast. It appears that this polar animal occurs now as far south as Hudson's Strait. Captain Handy told me that on the north side of Hudson's Strait the narwhale commonly goes in herds of thirty. Malmgren, a Finnish author, says that the narwhale leaves Spitzbergen in summer for more northern and colder latitudes.*

None of them, however, had ever seen a walrus, but the white bear was said to be not uncommon; and he mentioned the wolverine as occurring in the neighborhood. Showing Caspar the picture of the lobster in my Gosse's Zoology, he said it, with the shore crab, was not found here, but south of Grosswater Bay (Hamilton Inlet); the salmon (kavishilik) were taken in nets; he was also familiar with the starfish, which he called *ougiak*.

At sunset the chapel bell rang for evening prayers, and all left their work or houses and made their way to the sanctuary. The men and women sat separately and at opposite ends of the room, even entering by a separate door; and the oldest members of the congregation sat back on the higher benches, probably to overawe the juveniles on the front seats; although these must have been duly restrained by the presence of the seven missionaries who sat against the opposite wall on the right side of the leader's desk, their seven wives on the left. The service was brief, lasting twenty minutes, consisting of an invocation or address in Eskimo, and a few chants to German tunes, the congregation joining in the music

* Wiegmann's Archiv für Naturgeschichte, 1864, p. 96.

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of the organ, which was well played by an Eskimo boy. From the chapel all dispersed to their quarters, and the settlement long before dark was buried in profound silence.

Sunday, the 31st July, was a warm, sunny day, unfortunately as much enjoyed by the mosquitoes and black-flies as by us. In the forenoon we went to the service, which was simple and brief, the natives not being wearied with a long discourse; like the yesterday evening prayers it consisted simply of an invocation or address, congregational singing and the litany, and in half an hour the assembly dispersed.

The day was observed by the natives and all others with more reverence than we have noticed in Lutheran countries. The evening by invitation was spent aboard the "Harmony." Captain Linklater, an unusually intelligent man, was, as he told us, six weeks on his voyage from London here; he generally first sights Cape Webuc, though steering for "The Beacon" below Hopedale.

In sailing from Hopedale to Nain the "Harmony" takes an inside course. Above this point the coast is still more deeply indented by bays and fjords, their mouths checked with islands which extend fifty miles or more out to sea. The captain is ordered by the company or governor to take two Eskimo pilots from each port; he generally leaves them to return when fifteen miles out from harbor, as they are unacquainted with the rocks and shoals. Navigation to Nain is represented to be difficult; at one place the vessel has to double two points closing in one beyond the other. The captain while in harbor is gradually making charts of the coast, which at best can

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only be approximative; the missionaries have also, by ascending the highest points near their respective stations, taken the bearings of the islands about, Captain L. by a patent log taking the distance between them.* For ninety years a "Harmony"—the name being handed down to successive vessels—has made its annual voyage to Labrador, the missions having been established in Greenland in 1733 and first on this coast in 1771; during that time but two men have been lost from the vessel, one of them having been drowned by upsetting in a kayak.

From the hills east of the station the ice-field could be seen about ten miles out to sea, but bergs were visible all along the coast. Captain Linklater on this voyage encountered more ice than in any previous year of his service. He found the field to be eighty-five miles wide; and from careful observations during a number of years judged the rate of travel of the floe past the coast at this point to be at the rate of twenty-seven miles a day, or a little over a mile an hour. During this summer the ice had, as we had observed, been running down the coast from June 22d to August 22d, though it actually began earlier and must have continued later than that. That the ice finally disappeared by melting rather than by sinking we believe, though the fishermen on the coast maintain that it finally sinks. The extent of the ice-fields therefore off the coast of Labrador and Newfoundland must have been this season not much less than 80,000 square miles; the effect of such a wet blanket on the coast may well be imagined.

* The results of these surveys were embodied in a MS. map by the Rev. S. Weiz, and it was this map which was kindly loaned me by the Secretary, Mr. Latrobe, of the London office, and used in compiling the map of Labrador in the present volume.

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August 1st was spent in geologizing, as it was cold and cloudy, with an easterly wind. The island on which Hopedale is situated is of the ordinary Laurentian gneiss, which behind the mission house is curiously contorted; it is fine-grained, distinctly banded, with veins of quartz and of granite; at one point it dipped about 60° W. with a N. W. and S. E. strike. There are a number of trap dykes, in places like slightly winding stairs or steps descending to the water's edge, justifying the term *trap* applied to this rock, which is from the Swedish *trappa*, meaning a series of steps or stairs.

The rocks are water-worn and terraced to the tops of the hills. Behind the mission house is a raised beach of large, loose, rounded sea-worn bowlders, generally two feet in diameter, and mostly concealed by the growth of Empetrum; it is narrow and slopes down to a little bight east of the Eskimo village, and its shores are formed by what proved to be a raised sea-bottom. To our great surprise and delight this beach above and between tide-marks abounded in multitudes of deep-water shells with other fossils; and I spent half the day in picking them up, renewing the search the next day. That it was an old sea-bottom which had been raised at least from 75 to 100 feet, if not more, was proved by the habits of the shells, now living at the depth of from 15 to 20 fathoms off shore, and also by the quantities of nullipores encrusting the shells and pebbles, showing that the beach had not been disturbed since its elevation. Indeed it struck me, though I have no essential proof, that the coast of Labrador is now slowly rising, and this is also the opinion of Campbell (Frost and Fire).

Returning to the vessel towards night, an active trade

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VIEW AT HOPEDALE. ESKIMO AND THEIR WINTER HOUSES. (From a photograph by Bradford.) *To face page 206.*

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was carried on with the Eskimos to our mutual satisfaction; we bartered our old clothes for sealskin boots, mittens, and miniature kayaks, etc.

The two next days were warm and sunny, with westerly winds, and the time was mainly given to the entomology of the island, though the mosquitoes were excessively annoying. On the hills were the Chionobas butterfly, so wonderfully mimicking the colors of the lichens on the rocks. The little blue butterfly (*Polyommatus Franklinii*) was very abundant here, resembling some moths when in flight.

We made long calls upon the missionaries, finding them very cordial and pleasant, with much love of natural history. They returned our visit, and their wards, the Eskimos, swarmed over our vessel like flies. Always good-natured, without exception rigidly honest and upright, they were a continual source of interest and amusement. They lent us their kayaks, which are framed of spruce wood and covered with sealskin, and rather wider and therefore safer to row in than Greenland kayaks, which are framed with bone. I found it easy enough to paddle in them, but difficult to keep the bows steady on the course, each stroke of the double-ended paddle causing the bows to go too far one side; they are by no means so safe, however, as a birch canoe. Some of the passengers and our crew paddled for a distance of one or two miles, and after a little practice made good kayakers.

One day while rambling over the hills near the station I came upon a fissure in the rock, marked by a pole, and loosely covered with a few flat stones. It contained two skeletons, presumably of an Eskimo man and woman.

I hastily put the skull and bones into the bottom of

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my butterfly-net and covered them with grass; on my way past the chapel I came plump upon a wedding party going away from the doors. The bride led the party, clad in her old-time costume, with the addition of a calico skirt; at the distance of a few paces followed the groom, while the friends straggled along behind. Without being asked too curious questions I carried my precious freight aboard, glad—to use a sepulchral simile—to kill two birds with one stone, *i.e.* to secure the last remains of an old-time Eskimo couple and to see a young and living couple so recently united.

At Hopedale we understood the oldest person, the patriarch of the colony, to be a woman of seventy years: we saw her—a picture of ugliness which still haunts our memory. There were three Eskimos who were sixty years old. A man becomes prematurely old when forty-five years of age, as the hunters are by that time worn out by the hardships of the autumnal seal fishery.

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CHAPTER X.

A SUMMER'S CRUISE TO NORTHERN LABRADOR.

V. THE RETURN VOYAGE TO BOSTON.

On August 4th we bade farewell to Moravians and Eskimos; and with deep regret that it was not possible for us to go farther north, at least to the 60th parallel of latitude, we weighed anchor and ran with a fresh west wind abeam to Thomas's or Maggovik Bay, where the Norwegian Andersen lives in a well-wooded bight. Andersen told me he had seen only one sort of caribou, and did not know of a "barren-ground" as distinguished from a "wood" caribou. He also said that the white and blue fox littered together, but that the blue variety was very rare. After dredging a while in fifteen fathoms on a muddy bottom, where the interesting *Myriotrochus* was common, at 2 o'clock in the afternoon Mr. Bradford went with a boat's crew on a trading trip to Thomas's house. The wind being dead ahead we had to row all the way up, nearly thirty miles, and back, reaching the vessel at one in the night. We took a late supper at Mr. Thomas's hospitable house, and enjoyed a cup of tea with goat's milk and good bread. The house was comfortably situated near some quite sizable spruce-trees, with a flourishing garden near by. Mr. Thomas (for the site of his house see 17 on the map of Eskimo Bay) is

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a trader in furs, of which he had two or three hundred dollars' worth on hand, and he professed to have more than he wanted to live on. This little trip gave me some idea of the country inland, as Thomas's Bay is thirty miles deep, forming a broad sound, with few islands except at the mouth. Both sides of the bay are thickly wooded, with mountain summits rising bare and gray through the covering of dark green coniferous trees, the birches or poplars not being abundant enough to enliven the sombre hues of an evergreen Labrador forest. The contours of the ridges and hills were regular, the country was rather low, the scenery on the whole monotonous; and such, I conceive, are the features of the interior of the Labrador plateau, though diversified with lakes and deep river valleys. Both sides of the bay were terraced: on the north side were three long and regular terraces; those on the south side were less regular and much shorter; one formed a point of land perhaps a hundred feet high and descending into the water by three terraces. Farther up, the slope of the hill was paved with large sea-worn bowlders, for the most part covered over and hidden by the vegetation. At the mouth of the bay are also three naked terraces, the longer one winding up, following the shore, a growth of trees partially concealing it from sight. The return row down the bay and the sunset effects were extremely fine. I cannot attempt to describe them. How the scenery at this point appeared to a better artist in words than myself may be realized by the following extract from one of Rev. Mr. Wasson's papers in the Atlantic Monthly of May, 1865:

"In the early afternoon a dense haze filled the sky.

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The sun, seen through this, became a globe of glowing ruby, and its glade on the sea looked as if the water had been strewn, almost enough to conceal it, with a crystalline ruby dust, or with fine mineral *spiculæ* of vermilion bordering upon crimson. The peculiarity of this ruddy dust was that it seemed to possess *body*, and, while it glowed, did not in the smallest degree dazzle,—as if the brilliancy of each ruby particle came from the heart of it rather than from the surface. The effect was in truth indescribable, and I try to suggest it with more sense of helplessness than I have felt hitherto in preparing these papers. It was beautiful *beyond* expression,—any expression, at least, which is at my command.

"Such a spectacle, I suppose, one might chance to see anywhere, though the chance certainly never occurred to me before. It could scarcely have escaped me through want of attention, for I could well believe myself a child of the sun, so deep an appeal to my feeling is made by effects of light and color: light before all.

"But the atmosphere of Labrador has its own secret of beauty, and charms the eye with aspects which one may be pardoned for believing incomparable in their way. The blue of distant hills and mountains, when observed in clear sunshine, is subtile and luminous to a degree that surpasses admiration. I have seen the Camden Heights across the waters of Penobscot Bay when their blue was equally profound; for these hills, beheld over twenty miles or more of sea, do a wonderful thing in the way of color, lifting themselves up there through all the long summer days, a very marvel of solemn and glorious beauty. The Ægean Sea has a charm of atmosphere which is wanting to Penobscot Bay, but the

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hue of its heights cannot compare with that of the Camden Hills. Those of Labrador, however, maintain their supremacy above even these—above all. They look frozen sky. Or one might fancy that a vast heart or core of amethyst was deeply overlaid with colorless crystal, and shone through with a softened, lucent ray. Such transparency, such *intense* delicacy, such refinement of hue! Sometimes, too, there is seen in the deep hollows between the lofty billows of blue, a purple that were fit to clothe the royalty of immortal kings, while the blue itself is flecked as it were with a spray of white light, which one might guess to be a precipitate of sunshine.

"This was wonderful; but more wonderful and most wonderful was to come. It was given me once and once again to look on a vision, an enchantment, a miracle of all but impossible beauty, incredible until seen, and even when seen scarcely to be credited, save by an act of faith. We had sailed up a deep bay and cast anchor in a fine large harbor of the exactest horse-shoe shape. It was bordered immediately by a gentle ridge some three hundred feet high, which was densely wooded with spruce, fir, and larch. Beyond this ridge to the west rose mountainous hills, while to the south, where was the head of the harbor, it was overlooked immediately by a broad, noble mountain. It had been one of those white-skied days when the heavens are covered by a uniform filmy fleece, and the light comes as if it had been filtered through milk. But just before sunset this fleece was rent, and a river of sunshine streamed across the ridge at the head of the harbor, leaving the mountain beyond, and the harbor itself with its wooded sides, still

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in shadow. And where that shine fell, the foliage changed from green to a glowing, luminous red-brown, expressed with astonishing force,—not a trace, not a hint of green remaining! Beyond it the mountain preserved its whited gray; nearer, on either side, the woods stood out in clear green; and, separated from these by the sharpest line, rose this ridge of enchanted forest. You will incline to think that one might have seen through this illusion by trying hard enough. But never were the colors in a paint-pot more definite and determined.

"This was but the beginning. I had turned away, and was debating with myself whether some such color, seen on the Scotch and English hills, had not given the hint for those uniform browns which Turner in his youth copied from his earlier masters. When I looked back, the sunshine had flooded the mountain, and was bathing it all in the purest rose-red. Bathing it? No, the mountain was solidly converted, transformed to that hue! The power, the simplicity, the translucent, shining depth of the color were all that you can imagine, if you make no abatements and task your imagination to the utmost. This roseate hue no rose in the garden of Orient or Occident ever surpassed. Small spaces were seen where the color became a pure ruby, which could not have been more lustrous and intense had it proceeded from a polished ruby gem ten rods in dimension. Color could go no farther. Yet if the eye lost these for a moment, it was compelled somewhat to search for them,—so powerful, so brilliant was the rose setting in which they were embosomed.

"One must remember how near at hand all this was

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—not more than a mile or two away. Rock, cavern, cliff, all the details of rounded swell, rising peak, and long-descending slope could be seen with entire distinctness. The mountains rose close upon us, broad, massive, real —but all in this glorious, this truly ineffable transformation. It was not distance that lent enchantment here. It was not *lent;* it was real as rock, as Nature; it confronted, outfaced, overwhelmed you; for enchantment so immediate and on such a scale of grandeur and gorgeousness—who could stand up before it?

"In sailing out of the bay next day, we saw this and the neighbor mountain under noon sunshine (lat. 55° 20′). They were the handsomest we saw, apparently composed in part of some fine mineral, perhaps pure labradorite. In the full light of day these spaces shone like polished silver. My first impression was that they must be patches of snow, but a glance at real spots of snow corrected me. These last, though more distinctly white, had not the high, soft, silver shine of the mineral. Doubtless it was these mountain-gems which, under the magic touch of sunset light, had the evening before appeared like vast rubies, blazing amidst the rose which surrounded them.

"And this evening the spectacle of the preceding one was repeated, though more distantly and on a larger scale. Ph—— thought it the finer of the two. Far away the mountain height towered, a marvel of aërial blue. while broad spurs reaching out on either side were clothed, the one in shiny rose-red, the other in ethereal roseate tints superimposed upon azure; and farther away, to the southeast, a mountain range lay all in solid carmine along the horizon, as if the earth blushed

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at the touch of heaven. . . . All the wildness and waste, all the sternest desolations of the whole earth, brought together to wed and enhance each other, and then relieved by splendor without equal, perhaps, in the world,—that is Labrador."

Nearly all the next day was spent in beating down the coast, finding ourselves at evening off our old haven, Strawberry Harbor, which we did not enter, but remained outside of it, holding on to the rocks in twenty-five fathoms with our kedge. We lay over the edge of a submarine precipice, or, as I supposed, a rock terrace or shelf like those ashore; for just before anchoring the lead reached a depth of forty fathoms, showing quite plainly that the terraced character of the rock, which extends up the shore for a distance of perhaps 300 or 400 feet, also extends beneath the ocean to a depth of at least fifty fathoms or three hundred feet, thus conclusively proving that the coast had once been much higher than at present, and also showing how little the floe-ice had smoothed down the ocean-bottom near shore.

The next day we reached, but did not double, Cape Webuc (Harrison), as it was called, in the afternoon, and Mr. Bradford spent every available moment in painting icebergs. In the calm water we met with great numbers of that interesting and curious arctic pteropod, *Limacina helicina;* drawing up some in a bucket and placing them in a glass of sea-water, the beautiful movements of these delicate forms could be seen. They were like winged sweet-peas—the shape of the body and color suggesting the resemblance. It had not previously been recorded as occurring south of the Greenland seas. The

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fishermen, who had never seen them before this summer, said that the cod fed on them, and injured the fishery, but all this was the merest nonsense. We lay to among the icebergs all night, Bradford vigorously and indefatigably at work every spare moment, up at three o'clock in the morning, and painting the next day until a fog closed down upon the scene early in the afternoon.

The succeeding day (the 8th) we ran into Sloop Harbor, where we dredged in ten fathoms and drew up an interesting arctic Isopod crustacean.

On the 9th we entered Indian Harbor, where lived a Mr. Norman, who was carrying on an extensive fishery here, though this year it was, as everywhere else, a failure, the men at Sloop Harbor having to go thirty miles for bait. The salmon fishery was also pronounced equally abortive, only two hundred tierces having been netted in all Hamilton Inlet, whereas that amount is usually taken at a single point.

The scenery here—trap-hills and dykes giving some strange effects—was unusually picturesque, and Bradford was busy making studies and photographs. The gneiss is whitish in color, gradually sloping in rocky terraces to the shore, and extending under the fiord, the bowlder-laden, smooth bottom being perfectly visible at the depth of six or eight fathoms; and I have little doubt it could have been distinguished at the depth of ten or even fifteen fathoms.

Here for the first time on this coast were to be seen undoubted glacial marks. They occurred on the smooth ice-worn rocks about twenty-five feet above the harbor, not far from Norman's house, on the southern side of the tickle. They were lunate impressions varying in

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length from five to twelve inches, describing a curve from three to nine inches deep, and at the bottom of the crescent sunk an inch deep in the rocks. The hollows of the crescents opposed the northwest, showing that the glacier which produced such marks must have moved from the land, filling the great bay of which the fiord was an arm, and were sculptured in a smooth, highly polished whitish gneiss. The rocky shore was above the reach of the waves, but dampened by the surf and spray, so that the surface was entirely free of lichens, which covered the rock farther up from the water's edge.

That these were genuine glacial marks was evident to me at the time, and afterward sufficiently proved in my own mind when standing on the summit of Bald-face Mountain near Gilead, Me., where the lunate or crescentiform marks are abundant.

Ice marks have also been noticed by Campbell in his "Frost and Fire." *

* "The coast is now rising between St. John's in Newfoundland and Cape Harrison in Labrador. Rocks have been marked and the marks have risen; boats now ground on solid rocks where they floated twenty years ago; rocks which were seldom seen now seldom disappear at high tides; harbors are shoaling; beds of common shells are found high above the sea; raised beaches are seen on hill-sides in sheltered corners; and blocks of foreign rock are perched upon the summits of islands and on the highest hills near the coast. The rocks are much weathered, and very few striæ were found. Those which were found aimed up-stream. At Indian Island, lat. 53° 30', near the lat. of Hull, they pointed into Davis's Straits, at a height of 400 feet above the sea; at Red Bay, in the Straits of Belle Isle, they aimed N. 45° E. at the sea-level. In winter the sea is frozen near the coast to a thickness of eighteen inches or more; in spring the northern ice comes down in vast masses. In 1864 this spring drift was 150 miles wide, and it floated past Cape Race. From a careful examination of the water-line at many spots it appears that bay-ice grinds rock, but does not produce striation. The tops of conical rocks have been shorn off. The shape of the country is a result of denudation. No matter what the dip and fracture of the stone may be, the coast is generally worn into the shape known as 'roches moutonnées.'" (Vol. ii. p. 236.)

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The afternoon of the 10th we sighted the familiar outlines of Tub Island. The wind was southeast, and the next day it was too stormy to allow us to run out; and early in the succeeding day a dry northeast gale raged, but cleared off sufficiently in the afternoon to allow us to sail, in three hours, twenty-four miles to Dumplin Harbor, where dredging was profitable, though it was cold work hauling in the rope in the northeast wind.

The next day we beat against a southeast wind about twenty miles down to Cateau Harbor, passing numerous headlands on which raged a fine surf. The dredging in this harbor, where the sea-bottom was sandy and prolific in worms, shells, and Echinoderms, was excellent; among other rarities we hauled up specimens of the arctic holothurian *Myriotrochus Rinkii*, and a smaller simpler sea-cucumber, the *Eupyrgus scaber*, more like a small faded Martynia than a cucumber.

The 14th and 15th continued to be stormy, the wind northerly, with more or less fog, bergs and floating ice, making it dangerous sailing. We however got as far as Indian Tickle, where was the largest and best appointed fishing establishment we had yet visited, belonging to Mr. M. H. Warren, who lives in London during the winter, spending the summer here, where he employs two hundred and fifty men. Here the salmon fishery had been a failure, and the fishermen complained of the "black stuff" in the water, the delicate and interesting Limacina—which they declared "poisoned the fish."

At noon of the 16th, when the fog lifted, a northerly wind carried us into Domino Harbor. We found that there was some trouble at the "rooms" here about paying duties on produce brought upon this coast by traders.

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There being no representative from Labrador, which, however, is politically a part of Newfoundland, it was claimed that there should be no duties; they were therefore paid under protest to the judge and collector, James Winter, Esq., who had published under date of Nov. 12th, 1863, a report entitled "Impolicy and Objectionable Nature of Levying Duties upon Bread and Biscuit Imported from Hamburgh. By James Winter."

It appears that he had left Newfoundland (St. John's) June 15th, and was prevented by the ice from reaching Blanc Sablon before the 20th of July; where he reported that there were forty vessels, of which thirty-five sailed from Nova Scotia, the remainder being vessels belonging to the "rooms," and which brought out salt and manufactured goods from England. This harbor (Blanc Sablon) is perhaps the most important port on the Labrador coast. According to Winter's report the trade at Blanc Sablon is very extensive, consisting of two large supplying and fishing establishments belonging to Jersey, Messrs. Boutellier and De Quetteville & Co., and two smaller houses, also from Jersey, engaged in the fishery. This is the chief place of resort of the large number of fishing-vessels from Nova Scotia and other colonies which annually arrive at Labrador.

The 17th was spent in harbor at Domino, which to the geologist is one of the most interesting points on the coast. While walking over the barren Domino gneiss worn down by the glaciers, a flock of twenty-five curlews flew overhead, but they were late, as was everything else this year.

The 18th we set sail from Domino Run for Henley Harbor in the face of a southerly storm, and beat to

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windward all day in the fog and rain, making about thirty miles. We passed many fine icebergs, some of them of magnificent proportions, moving down the coast in a stately way, while others were left stranded close inshore.

We remained outside in the fog through the night and early part of the next day; took a northerly storm in the afternoon, and lay to during the night for fear of encountering the bergs or pieces of floating ice.

We here saw in a large school of humpback and fin whales what Captain Handy pronounced to be a sperm-whale by its "spout," which formed a single short stream of vapor curling over in front from the blow-hole, which is situated at the end of the nose. Mr. Pike (at Square Island) told us that a school of nine sperm-whales used to pass annually up and down the coast, but that now only five of them were remaining; we may have seen one of the five.

After a very uncomfortable night, having heaved to in the darkness in a heavy swell and calm to avoid colliding with the ice, which in scattered bergs and floes surrounded us, we finally on the 20th ran before a fresh northeasterly gale into Henley Harbor.

Sunday the 21st was, after the fog had cleared away in the morning, a very pleasant day, though towards night the easterly wind again brought in the fog. Colonel Amory and myself went over to an island on the west side of the harbor, where a recent severe gale, in which three vessels had been driven ashore, had washed off the soil so as to disclose some graves supposed to be those of Eskimos. We dug into them, finding a few bones and pieces of flannel; the former were too much decayed

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to be of any value. An under-jaw given me by a man who lived near by and who had taken it from the graves had double teeth (*sic*) all around, the front teeth being worn down to the gums, the two jaws not overlapping (this being an Eskimo characteristic); the jaw resembled those of the skulls from Hopedale. There were several graves formed by natural fissures in the rocks, covered over by a layer of stones, with soil heaped over them, each forming a sort of natural dolmen. No one knew about them, but it was supposed that they may have been the graves of those killed in a battle of the Eskimos with the Indians. Battle Point, a little way up the coast, commemorates a sanguinary fight between these two races of Labrador aboriginals.

I now learned that the old fort situated on a bluff on the terrace previously described was built by an early settler named Greville, who held out one winter against the wiles of the Indians until, during a deep snow-storm which barred up the cannon of the fort and choked up the embrasures, the dusky assailants scaled the walls and gained entrance within. Our informant said that Greville wrote a history of Labrador. Near the fort was a circular area paved closely with cobble-stones, but nearly overgrown with Empetrum, which was said to have been the foundation of a Nascopi wigwam, but was more probably of Eskimo origin.

The 22d was a fine day but nearly calm, and the forenoon was spent with the insect-net in hand. The curlews were quite abundant, perhaps a hundred being seen. After dinner we hauled up anchor, and Bradford went out in search of icebergs. Two small bergs were seen near the southern end of Belle Isle and farther down the

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Strait; one of them broke to pieces during the night, and we afterwards saw the fragments floating upon the water some miles inshore. We lay all night becalmed six or seven miles from shore, drifting slowly down the Strait with the Labrador current; before night I dredged in from forty to fifty fathoms on a hard, pebbly bottom, bringing up besides the common red seaweed (*Ptilota*) only a shrimp or two.

Towards noon of the following day a steady easterly breeze carried us down the Strait, and we lay to in the fog all night, until after breakfast of the 24th it lifted somewhat and we found ourselves near Whale Island, three miles west of Whiteley's, and by eleven had fortunately worked into the harbor of Salmon Bay off John Goddard's house near Caribou Island. We went to Rev. Mr. Carpenter's mission house for our letters, and were glad enough to accept his hospitality that night, not only as a pleasant change from sleeping in a bunk, but to renew an agreeable acquaintance.

I collected more Quaternary fossils from the beach, though it rained and blew hard all day. We learned that the weather here had been pleasanter than "to the nor'ard," and that though the cod fishery had been "bad," it was now beginning to "look up." The stormy season was now about to set in, and it was high time that such craft as ours should leave the coast. No sail-boats can be used here with safety after the middle of September, the autumn winds are so gusty, with calms and sudden flaws. Only the small sails of the Newfoundland vessels and their large crews enable them to coast along this region after that date.

On the 25th we fairly got under way for home,

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taking the tail end of yesterday's storm, though before the anchor was weighed I did some good dredging, bringing up among other notable creatures *Tritonofusus cretaceus*. On the whole the Strait of Belle Isle presented the most varied and rich dredging grounds I met with on the coast. We now had before us a run of 340 miles from Salmon Bay to the Gut of Canso, it being 80 miles from Bird Rock to the latter strait. At about five in the afternoon of the 27th the wind hauled into the southeast and freshened into a gale of wind during the night; it was very thick, but there was no rain. We lost our reckoning and came near running ashore between Bird Rock and Byron Island, making seven fathoms' sounding twice; moreover, the forecastle stove upset, and the floor got on fire, so that between the danger of shipwreck and of fire we had an anxious night.

On Sunday morning, the 28th, we ran under jib and reefed mainsail past Bird Rock to the westward of the Magdalen Islands, just seeing land through the thick rain and mist and driving spray, and part of the time a cold sleet. The water came in over our rail; things above and below were knocked about a good deal, and some bilge-water leaked into the cabin. At 2 P.M., however, the gale broke, the rain abated, and after a while the sun broke through the clouds and lighted up, intensifying the rich red hues of the long, low shores of the Magdalen Islands. Here for the first time we saw the fish hawk, while the gannets, glorious birds while on the wing, were diving from far aloft for mackerel, or soaring up among the low rain-clouds. The 29th was warm and pleasant, and we passed many sails, some going to the Magdalen Islands, but most of them converg-

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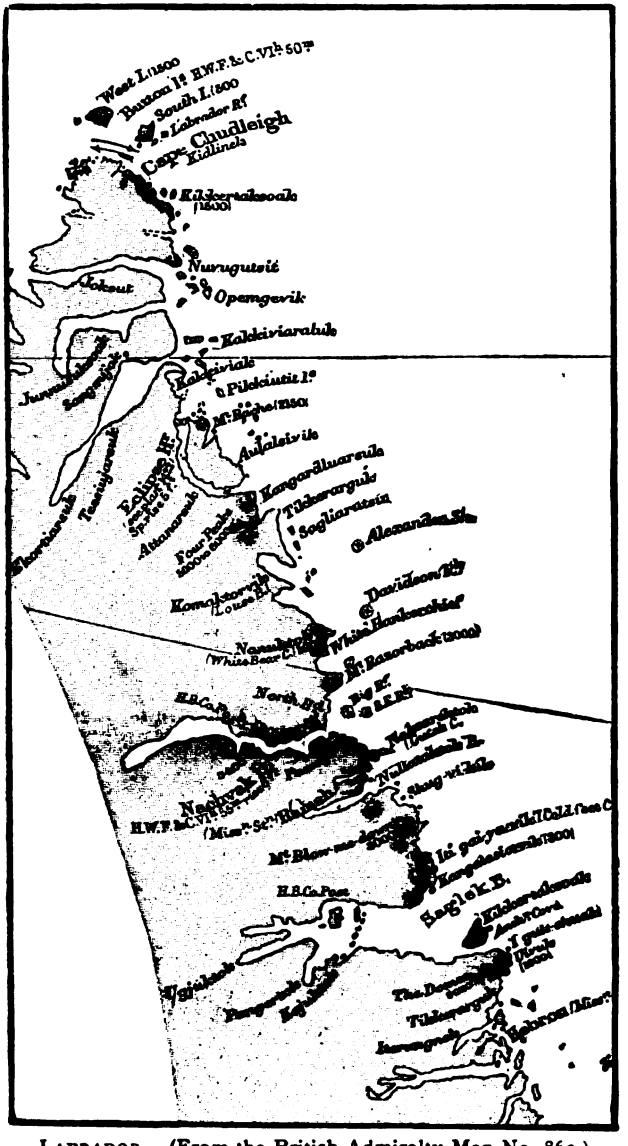
ing like a flock of sea-birds towards the Gut of Canso. About ten o'clock in the forenoon we lost sight of Deadman's Island, the southernmost point of the Magdalens, and at two o'clock in the afternoon sighted the Prince Edward's Islands, and soon after espied Cape Breton Island.

We expected to reach Port Mulgrave early the next morning, but our hopes of letters, papers, fresh potatoes, and beef on the morrow were dashed to the ground, as soon after sunset we were becalmed and had to come to anchor within six miles of that delectable haven. We got into Port Mulgrave the next morning, when six of our passengers left to return home overland.

We left Port Mulgrave on the morning of the 1st September, passed Halifax light at eight o'clock in the next evening, and at half-past seven in the evening of the 3d sighted Thatcher Island light, and ran up to our pier at Boston the next morning.

A few words as to the scientific results of our voyage. Although we failed to reach Cape Chidley and to see the higher Moravian mission stations and Eskimos, or to do much dredging in water over fifty fathoms in depth, yet every possible facility was afforded me by Mr. Bradford, and the results of the voyage were perhaps of some service to science. Our geological notes of the coast were fuller than any yet published; over seventy-five raised beaches were discovered; glacial phenomena of interest were observed, and the fact of the recent glaciation of the northeastern part of the Labrador peninsula was for the first time proved. Dredgings were made among the islands from Mecatina to Hopedale, and a considerable number of new species of marine invertebrates, as

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LABRADOR. (From the British Admiralty Map No. 863.)

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well as insects, secured, while it was made evident that the polar fauna and flora, both land and marine, extends southward into the Gulf of St. Lawrence, many interesting arctic forms occurring which had never before been dredged south of Baffin's Bay; valuable data were also obtained showing that the life along the coast of Maine during the Leda epoch of the glacial period was nearly identical with that of the Labrador coast, and that the alpine fauna and flora of Mt. Washington in New Hampshire is a remnant of the Labrador assemblage of plants and animals; notes of interest on the distribution of the fish and mammals were obtained, particularly of the walrus, white bear, and narwhale, while the collections of insects were tolerably complete, enabling us to compare the Labrador insect fauna with that of Norway, Sweden, and the Alps of Switzerland.

A voyage to the Labrador coast is an exceedingly healthful one; its interest to the sportsman would be enhanced if, in a steam-yacht and launches, the salmon streams could be explored and the game reached. But for lovers of grand coast scenery, famous for its peculiar wildness and far-reaching desolation, and which is only inferior to that of Norway, we recommend a cruise to Northern Labrador.

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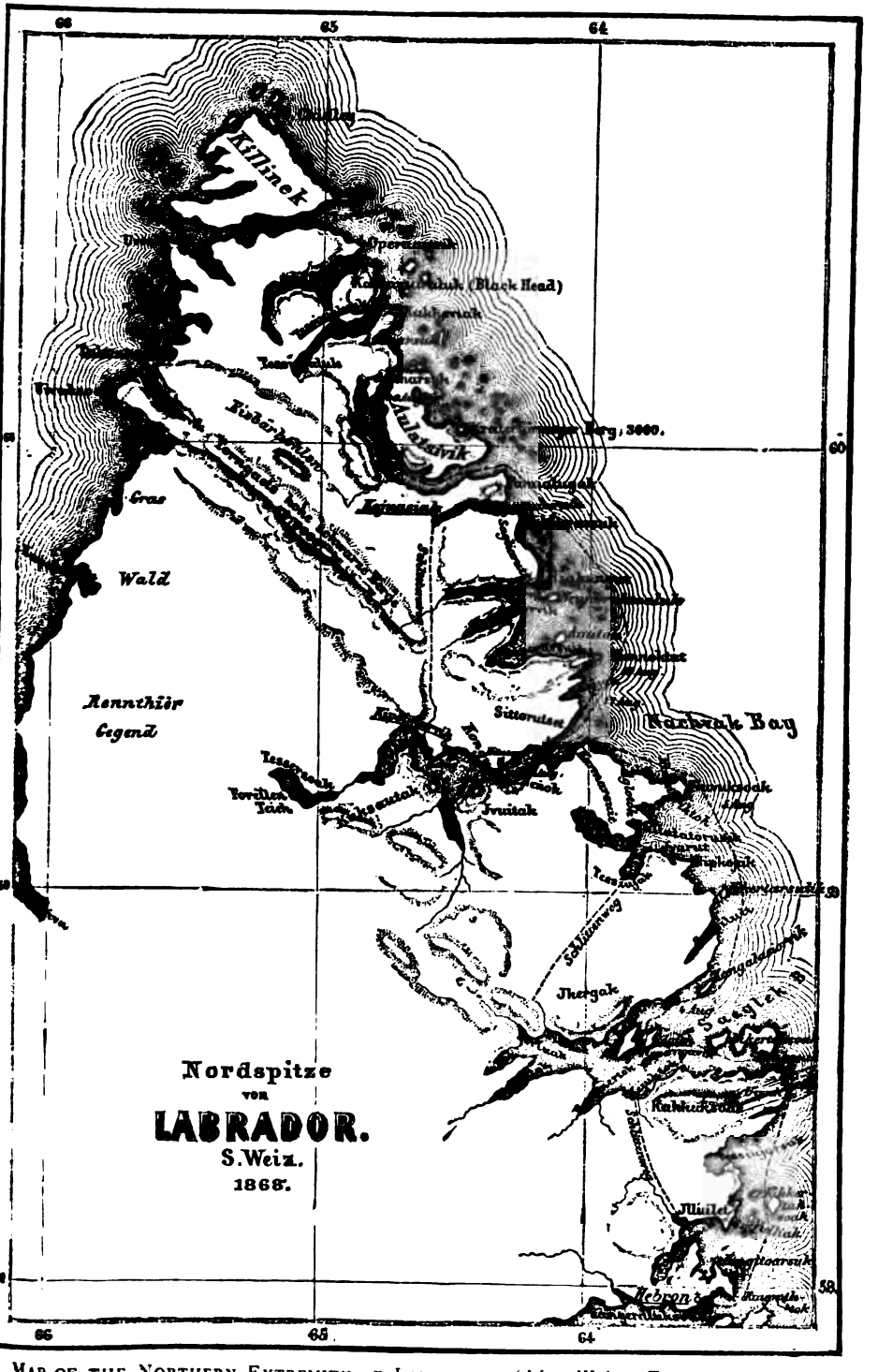
CHAPTER XI.

RECENT EXPLORATIONS.

Of late years fresh attention has been paid to the exploration of the Labrador Peninsula. Dr. Franz Boas has published in "Science" for Feb. 17, 1888, "Notes on the Geography of Labrador," which contains reference to explorations in this country undertaken within a few years. Dr. Boas, it appears to us, erroneously states that the MS. map by Rev. S. Weiz, which we used in the compilation of the map in the present volume (originally published in the Bulletin of the American Geographical Society), "was published in January, 1869, in the *Missionsblatt aus der Brüdergemeinde.*" The MS. map loaned us by the Rev. Dr. Latrobe must have been a later one, with corrections, as it differs in a number of essential points, as may be seen if any one will examine the copy of the Moravian map published in "Science," and also previously in the *Missionsblatt*, with that in this book; for example, Weiz's earlier published map represents Killinek, near Cape Chidley, as one large island, whereas in our map the Killinek of 1869 is represented by two large islands. Also, Nachvak Inlet, Saeglek Bay, and the inlet on which Hebron is situated are very different in the two

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Nordspitze
von
LABRADOR.
S. Weiz.
1868.
Wald
Gras
Rennthier
Legend
Nachvak Bay
Hebron
Killinek
Saglek
Jhergak
Sattelberg
Jwuitak
Sittorutsek
Tessiusak
Kaumajok
Jllaitek
Kakkasiksik
Tessiusak
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maps; while no mountain ranges were inserted in the London MS. map of Mr. Weiz.

Our knowledge of the interior of Northern Labrador has been somewhat extended by Dr. R. Koch, who wintered in Nain in 1882–83, his brief but interesting account being published in the *Deutsche Geographische Blätter* (Band VII. Heft 2, 1884, pp. 151–163). The Eskimos in the spring go after reindeer in sledges from Nain to the plateau of the interior, which is reached after a journey of four or five days, at the rate of thirty English miles a day, through fiord-like valleys. After one or two days more the height of land is reached. This water-shed approaches the shore in the northern part of the peninsula, being only one day's journey distant from Rama, which is the northernmost Moravian station, being situated in lat. N. 58° 52′ 54″. From this water-shed arise the rivers Koaksoak and Kangerdlualuksoak (George River), which flow into Ungava Bay. This water-shed terminates in Killinek, and its outliers form the Button Islands. The narrower the mountainous district becomes, the higher it is. Near Hopedale the mountains, so far as Koch could see from looking inland, rise only a few hundred feet; while at Nain the mountains close by the sea are from 800 to 1,200 feet high. The Kiglapait, or Saw-teeth Mountains, between Nain and Okkak, have an elevation of several thousand feet (2,000, according to the British Admiralty chart). Kaumajat (Shining Mountain), situated south of Hebron, reaches this height (see p. 9). Although Koch has added nothing materially new to the information given in the first chapter of this book, we may add that he states that north of Hebron the coun-

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try is alpine in character, the mountains rising almost vertically from the sea; but although the peaks attain a great height, there are no ice-fields and shining snow-clad peaks; at the most, snow-fields and miniature glaciers. Deep, narrow fiords (Sorviluck, Nullatarkok, and Nachvak) cut into the coast, which is not along here sheltered by islands from the heavy swell of the ocean. While south of Hebron numerous islands lie scattered off the mouths of the bays, northerly from Komaktorvik there are numerous islands and very dangerous cliffs, the Naviarutsit and Nuvurutsit, which extend up to Ikkerasak Torksuk, viz., the great thoroughfare, abounding in whirlpools, of the Eskimo to Ungava Bay.

Near Rama, Koch ascended a mountain 2,600 feet in height. He describes the scene as very grand: "At my feet I saw the deep, bluish-green fiord surrounded by steep, wall-like cliffs. The mountains were covered with shrubs colored red by the first frost of the season. To the left spreads the dark-blue ocean, with its greenish-white icebergs. On the opposite side of the fiord, and towards the west, extended steep and ragged mountains and narrow, gorge-like valleys, in one of them a dark lake, the water of which, black as ink, reflected the high peaks. In the interior I saw mountains rising to still greater heights, and covered with fresh snow, extending north and south as far as I could see. The highest points of this range are opposite the island of Aulatsivik, and reach elevations of from 8,000 to 9,000 feet. While mountains less than 1,500 or 2,000 feet in height are rounded, and bear evidence of having been

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covered by glaciers, the ragged forms of the higher mountains show no such signs."

All the lower mountains have rounded, often smoothly polished, summits, and are covered with numberless fragments of other stones, differing greatly in size, and not arranged into moraines, but scattered over mountains and valleys, and often lying in the strangest positions. The summits of the highest mountains, on the contrary, are split by the frost into sharp, rugged, enormous teeth.

Koch then describes a typical valley near Nain, one near the Kauk (the Cliff), into which flows the Kaubkonga (Kauk River). Passing out from the mouth of the winding valley, the stream, often broken into rapids, ends in a water-fall about forty feet high, which plunges into a lake, the Ekkalulik (viz., the place where there are trout), into which two streams open, the Kaubkonga and the Jordan. The two rivers flow by rapids out of different lakes, the Jordan out of the Tessialuk (Breeches Lake of the missionaries), the Kaubkonga out of the Tachardlek (Star Lake). Beyond these are four other lakes, connected by short streams broken into rapids and cataracts, and which lead up to the Kairtoksoaks, where the streams take their origin. The Kaubkonga is a relatively strong stream, but is a type of all the Labrador rivers, being a chain of lakes connected by rapids or cataracts. "All the streams, so far as I have observed, at least those which flow into the Atlantic Ocean, have this peculiarity: evidently the corroding action of the water during the short summer has not not been sufficient during the short time which

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has elapsed since the melting away of the glacial covering to wear the river-valleys into continuous courses."

Koch also observed raised beaches from 10 to 30 metres in height above the sea, and from all his observations he concludes that after the glaciation of the coast there was a depression of the land, as proved by the old beaches, followed in recent times by a slow upheaval.

Some additional information regarding Northern Labrador, says Dr. Boas, is contained in the publications of the reports of the German polar stations of the international system. "Since Koch's visit to Labrador, meteorological observations are being made at all missionary stations of the Labrador coast, which are of particular value as filling the wide gap between the system of Canada and the Danish stations in Greenland."

We have already on page 7 given a brief account of Dr. Bell's observations made in 1884 on the physical geography of the extreme northern coast of Labrador.

More recently the commissioner of crown lands of Quebec has sent surveyors who have explored the numerous rivers emptying into the St. Lawrence, Mr. C. E. Forgues having surveyed the rivers St. John, Mingan, Natashquan, and Esquimaux. During the summer of 1887 the missionary Edmund James Peck succeeded in crossing Labrador from Richmond Bay to Ungava Bay, but as yet no account of what must have been a very interesting journey has appeared. Dr. Boas adds that "Green Island, in Hudson Bay, as shown on Packard's map, does not exist according to observations made by Gordon on his expeditions to Hudson Bay. The archives of the Department of Marines of France possess a number

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of manuscript maps of Hudson Strait, which, however, have not been published."

Very full and detailed information regarding the region of Fort Chimo is contained in the report of Mr. L. M. Turner to the U. S. Signal Bureau, which has not yet been published. But until some explorers cross the peninsula from Fort Chimo to Nain or Hopedale, and also ascend the Esquimaux River to its source, we shall be much in the dark regarding the nature of the interior of Labrador. An attempt to penetrate the interior from the head of Eskimo Bay (Lake Melville) was made in 1887 by Mr. Randle F. Holme, whose interesting account, illustrated by an excellent map of the entire Labrador peninsula, appeared in the Proceedings of the Royal Geographical Society, April, 1888. We have found his map of great service in compiling that of Southern Labrador in the present book.

Mr. Holme tells us that on one occasion Père Lacasse, the Roman Catholic missionary to the Indians, journeyed from Mingan to Northwest River by the Mingan and Kenamou rivers, and from Northwest River to Ungava by the Nascopee and Waquash rivers.

Mr. Holme ascended the Grand River, which empties into Aivuktok Bay, as far as Lake Waminikapou, his point of departure being the Hudson Bay post of Rigolet. After exploring the mouths of Gudder's Bight River, of the Kenamish, the Kenamou, and the Travespines River, Mr. Holme ascended the Grand River 150 miles, to a point within 50 miles of the Grand Falls, whose height is unknown, but which he regards as with little doubt "the most stupendous falls in the world." The river is said by Maclean to be 500 yards broad above the falls,

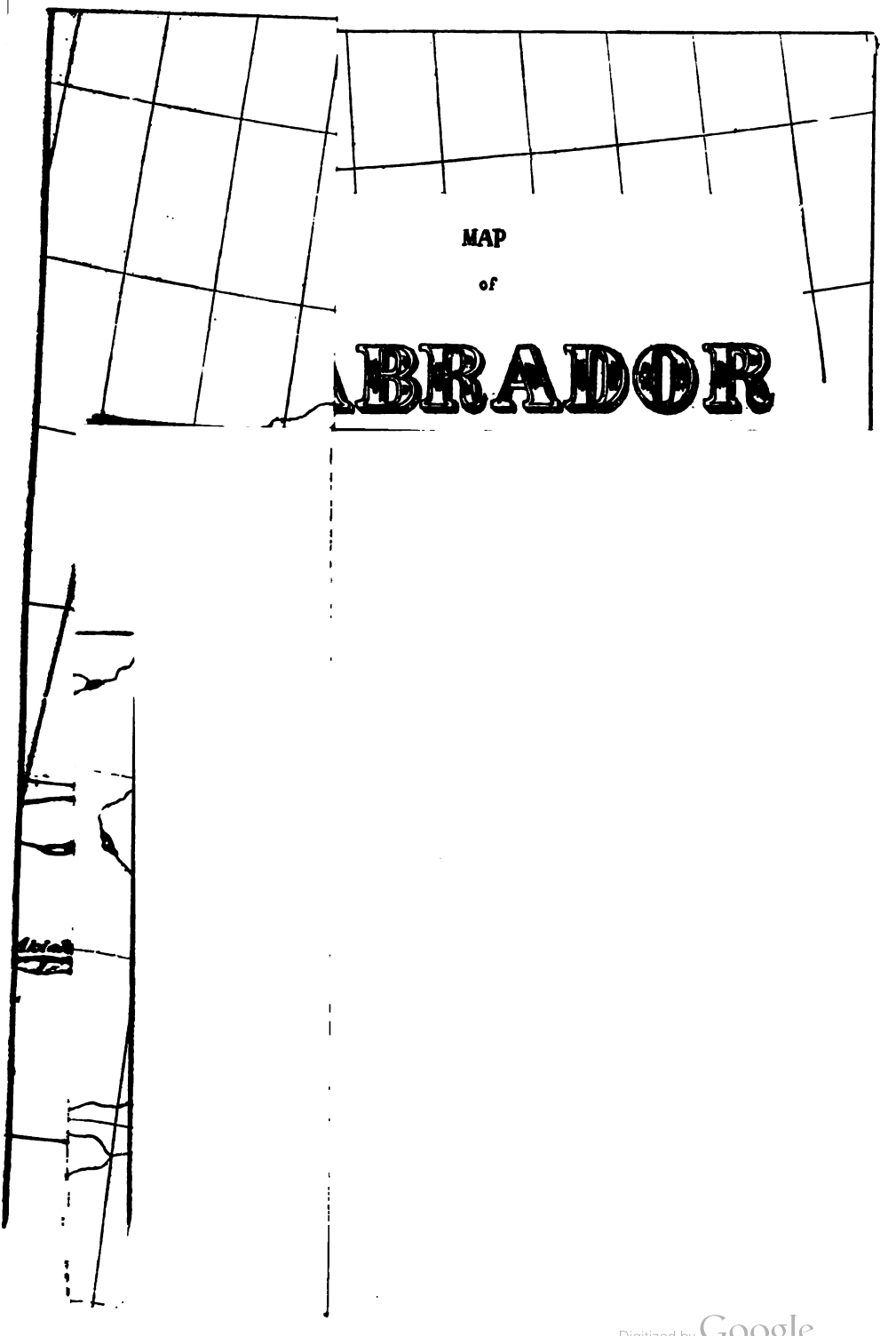
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contracting to 50 yards at the falls themselves. We are not satisfied with Mr. Holme's estimate of the probable height of these falls; their exploration would certainly reward any one who is sufficiently enterprising and has sufficient knowledge of geology and natural history to make the journey profitable.

In regard to the canoe route from the Strait of Belle Isle up the Esquimaux River to Lake Melville, we may add that the Rev. C. C. Carpenter kindly obtained during the winter of 1888–89 the following notes from Mr. W. H. Whiteley, who has spent many summers at Bonne Esperance, a little island at the mouth of this river, and can speak with authority, as he is "the most intelligent and reliable man on the whole coast," and is the magistrate of this section of the Labrador coast.

"About Esquimaux River, from all I have been able to gather from the Indians, I think that there is a large plateau in the interior about five days' walk, for an Indian, from our place, probably about 250 miles. They can walk from Bonne Esperance to Rigolet in ten days, so they say. They tell us that St. Augustine River rises from the same lake as Esquimaux River, but I think they mean the same level plateau. The interior of Labrador is wholly water; certainly four fifths of the surface is cut up into small ponds and lakes, which makes travelling except by water impossible unless in winter; when on the ice one can make a straight course, and I suppose this accounts for the intense cold for such enormous bodies of ice, for the lakes are mostly shoal and freeze to the bottom, making a huge ice-house of Labrador all the spring months, and, as you know, well up into the summer."

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The means of communication with Labrador from England is by steamer to Newfoundland, whence mail steamers make at least two trips each summer from St. John's along the Labrador coast as far north as Nain, while the steamer goes as far west as Bonne Espérance in the Strait of Belle Isle. Mr. Holme states that "new and superior steamers are being built for the coastal service from St. John's, and will begin to run this summer" (1888). Steamers also ran during the summer of 1890 once a fortnight from Halifax through Cape Breton Island along the western coast of Newfoundland, touching at Blanc Sablon. There is also communication by sailing-vessels from Quebec, and occasionally a pleasure-party from Boston or some other port in the United States visits the Labrador coast.

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CHAPTER XII.

A GLANCE AT THE CIVIL HISTORY OF LABRADOR, WITH AN ACCOUNT OF ITS FISHERIES.

THE history of Labrador can be told in few words. The permanent residents dwell exclusively on the coast, and, as a rule, in the more sheltered harbors and fiords. The principal settlements on the shore south of the Strait of Belle Isle are Bonne Espérance, Forteau Point, Blanc Sablon, Belles Amours, and Henley Harbor, a few families being scattered along the shore between these points. On the Atlantic or eastern coast the most important settlement is at Battle Harbor, "a sheltered roadstead between Battle Island and Great Caribou Island, about half a mile in length and quite narrow." Farther north are St. Francis Harbor, Batteau Harbor, Occasional Harbor, Square Island Harbor, Domino Run. At Cartwright Bay is the southernmost Hudson Bay Company's post, and these are scattered along at rare intervals as far north as the fiord or inlet of Nachvak, the most important post being situated at Rigolet in Melville Bay, while at Fort Chimo in Ungava Bay is another post belonging to this company.

The population of the St. Lawrence coast of Labrador from Port Neuf to Blanc Sablon numbers about 4,400, comprising English, and French of Canadian or

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Acadian origin, who subsist chiefly by fishing and hunting. Of the whole number 3,800 are Roman Catholics and 570 are Protestants.

In the scattered settlements north of the Strait of Belle Isle one meets with English, Scotch, and Jersey sailors or their descendants, who make a very precarious livelihood by fishing in the summer and fur-hunting in the winter. The map at the end of this chapter will serve as a directory of the coast from Sandwich Bay northward. The summer or floating population of Labrador is estimated at about 30,000, mostly Newfoundlanders.

"The last census taken by the government of Newfoundland, in 1874, gives the resident population from Blanc Sablon to Cape Harrison as 2,416. Of these 1,489 belong to the Church of England; 476 to the Church of Rome; 285 are Wesleyans; 30 are Presbyterians, and 126 belong to other denominations. There are nine places of worship: four of the Church of England, three of the Church of Rome, and two of the Wesleyan Church.* According to Hatton and Harvey the total population of Labrador was in 1874 about 12,527, distributed as follows:—

On the St. Lawrence coast, from Port Neuf to Blanc Sablon	4,411
On the Atlantic coast, white population	2,416
Eskimos	1,700
Indians of the Interior	4,000
	12,527

By a more recent estimate the number of Eskimos is placed at 1,500 or less. It is also probable, judging from

* Hatton and Harvey's Newfoundland; Boston, 1883, p. 297.

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newspaper statements of famines in Labrador due to the failure of the fisheries in late years, that the white population of the coast has been somewhat diminished, and we doubt if the total population exceeds 12,000.

For the following brief history of Labrador we are indebted to the chapter on Labrador in Hatton and Harvey's excellent work on Newfoundland.

The boundaries between Newfoundland and Canadian Labrador are thus defined in the "Letters-Patent Constituting the Office of Governor and Commander-in-chief of the Island of Newfoundland": "We have thought fit to constitute order and declare that there shall be a Governor and Commander-in-chief (hereinafter called our said Governor) in and over our Island of Newfoundland, and the islands adjacent, and all the coast of Labrador, from the entrance of Hudson's Straits to a line to be drawn due north and south from Anse Sablon on the said coast to the fifty-second degree of north latitude, and all the islands adjacent to that part of the said coast of Labrador, as also of all forts and garrisons erected and established, or which shall be erected and established, within or on the islands and coasts aforesaid (which said islands and coast, together with the Island of Newfoundland, are hereinafter referred to as our said colony), and that the person who shall fill the said office of Governor shall be from time to time appointed by commission under our sign-manual and signet."

In 1864 the boundaries of the Newfoundland portion of Labrador were thus defined:* "The western limit of the government of Newfoundland is lat. 51° 25′ N.,

* Appendix to the "Journal of the House of Assembly," 1864, p. 613.

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long. 57° 9′ W., and includes Blanc Sablon and the Woody Islands. The northern boundary is Cape Chudleigh, in lat. 60° 37′ N., long. 65° W." Hatton and Harvey then add: "Thus a line drawn due north and south, from Blanc Sablon to Cape Chudleigh, constitutes the boundary between the two jurisdictions." If the reader will draw the line on the map, he will see that it would include only a thin strip of the coast from Blanc Sablon to Davis's Inlet; that it would not include the western part of Melville Bay, and north of Davis's Inlet or the Moravian settlement of Zoar, would pass almost to the westward of the mainland, including only some of the promontories and the outer islands from Zoar to Cape Chidley. This was evidently not the intention of the British Government. The natural boundary line between Newfoundland and Canadian Labrador would be, it seems to us, the Eskimo and Kenamou rivers, the western shores of Melville Bay and of Grand Lake, and north of this point the chain of lakes lying on the height of land extending along near the 65th parallel of longitude, the natural boundary line on Ungava Bay being Whale River.

Hatton and Harvey's history then states: "This portion of Labrador was not always attached to Newfoundland. The first annexation took place after the Treaty of Paris, 1763. While the flag of France waved over Canada, the French carried on extensive fisheries on the Labrador coast, near the Straits of Belle Isle, to which they attach the greatest importance. After the conquest of Canada by Britain, a company established in Quebec obtained a monopoly of these fisheries which lasted for sixty years, but was brought to an

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end in 1820. Until 1763 the fisheries of the whole southern and eastern shores of Labrador were placed under the government of Quebec. Increased importance was given to the governorship of Newfoundland at that date by annexing to it the Atlantic coast of Labrador. Ten years after, in 1773, it was considered advisable to restore this portion of Labrador to Canada, owing to difficulties arising out of grants made to a number of persons under the rule of the French. In 1809 it was again transferred to the jurisdiction of Newfoundland, under which it has remained ever since. A Court of Civil Jurisdiction, on the coast of Labrador, was instituted in 1824. A special court of civil and criminal jurisdiction, called 'The Court of Labrador,' and presided over by one judge, appointed by the Governor in Council, secured the administration of justice. The customs' duties levied on goods landed on Labrador are the same as in Newfoundland. The Hudson Bay Company had formerly the exclusive right of trading with the Indians of that part of Labrador which had rivers flowing into the inlet from which the company took its name, and which is designated East Maine. In 1870, however, the company surrendered all their rights of government, property, etc., in the whole of British North America; and these having been transferred to the Dominion of Canada, the company being still at liberty to carry on their trade without hindrance, or any exceptional tax, Canada has thus jurisdiction over all the region of Labrador which does not belong to Newfoundland."

The two most notable and romantic events lighting up the usually prosaic course of Labrador history were

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the founding by the Breton fishermen and traders of the town of Brest, in Bradore Bay, about 1520, and the battles at Château. It will be remembered that this town is estimated to have had upwards of 1,000 residents; its ruins and terraces being still visible. The other event, or rather series of events, occurred farther up the Strait of Belle Isle, and the scenes were less peaceful. Château, or what is now called Henley Harbor, was originally colonized by the Acadian refugees, who either built a fort here or more strongly fortified Greville's Fort, originally built to resist Eskimo attacks. The remains of these fortifications are still extant. "In 1763 a British garrison was located at Château, in order to protect the fisheries; but the place was captured in 1778 by the American privateer 'Minerva,' and three vessels and £70,000 worth of property were carried away as prizes. In 1796 the post was again attacked by a French fleet. A long bombardment ensued between the frigates and the shore batteries, and it was not until their ammunition was exhausted that the British troops retreated into the back country, after having burned the village. In 1535 the French exploring fleet, under the command of Jacques Cartier, assembled here."

We have already spoken of the Eskimo inhabitants of the coast. The Indians inhabit the interior, and, as has been remarked, they are perhaps now the only truly wild, untamed red-men of North America. They are of the Mountaineer (or Montagnais) and Nasquapee (or Nascopi) tribes, and though they are roughly estimated to number 4,000, they are supposed to be slowly disappearing. "Game," say Hatton and Harvey, "on

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which they depend, is becoming scarcer every year, owing largely to destructive fires which have swept over vast areas, destroying forests, berry-bearing shrubs, mosses and lichens, and converting whole districts into hopeless deserts strewed with naked bowlders, where no animal life can exist. Some of the Nasquapee tribe are still heathen, but the Montagnais are nearly all nominally Roman Catholics. The zealous Jesuit missionaries of early times extended their labors from Canada to Labrador, and these have been specially successful among the Montagnais. Of late years they have been resumed, and are now systematically carried on. The Indians hunt over the interior, and at certain seasons visit the coast in order to exchange the products of the chase for clothing, ammunition, and other necessaries.

Labrador, both politically and commercially, is the great dependency of Newfoundland, more than a fourth of the entire export of the fishery product of that colony being taken on the coast of Labrador. The average annual catch of Newfoundland fishermen on the Labrador coast is from 350,000 to 400,000 quintals of codfish, 50,000 to 70,000 barrels of herring, and from 300 to 500 tierces of salmon. The number of Newfoundlanders who frequent the Atlantic coast of Labrador during the summer, from the end of June till the first or second week of October, is estimated at 30,000, from 1,000 to 1,200 fishing vessels being employed each year.

It has been already stated that the fishermen have only in recent years gone up the coast for their fares beyond Hopedale. When we visited the coast in 1864 scarcely any fishermen went beyond Hamilton Inlet.

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The numerous fishing banks and shoals lying off the Atlantic coast on the edge of the continental shelf, and probably forming the winter feeding grounds, from which early in July the codfish migrate inshore, form an area of 7,100 square miles. It is thought by Hind that the great cod fishery of the future will probably be along Northern Labrador and over the adjacent banks.

The American fishermen have abandoned the Labrador coast, preferring the Newfoundland banks, which are nearer to their homes. As late as 1880 about one hundred Canadian and Nova Scotia vessels were annually engaged in the Labrador fisheries. Formerly a good many Jersey fishermen frequented the coast, where there were several of their fishing establishments; but of these only three remained up to 1880, while all the English mercantile houses have been withdrawn.

It is estimated that the aggregate value of the fisheries from all sources on the entire coast "will not fall short of a million pounds sterling per annum."

The present value of these fisheries is shown by the following extracts from Hatton and Harvey's "Newfoundland":

"Exports from Labrador for the year ending July 31, 1880:

NEWFOUNDLAND HOUSES.

Dried codfish	393,436 qtls.
Green do	144 "
Sealskins	1,096
Seal oil	50 tuns.
Cod oil	76 "
Other oil	1 "
Blubber	17 "

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Pickled salmon	592 tierces.
Pickled herring	16,970 bbls.
Pickled trout	14 "
Pickled mackerel	459 "
Dried caplin	58 "

EXPORTS BY LABRADOR HOUSES NOT CONNECTED WITH NEWFOUNDLAND, FOR YEAR ENDING JULY 1, 1880.

Dried codfish	14,000 qtls.
Sealskins	110
Seal oil	14 tuns.
Cod oil	55 "
Refuse	2 "
Blubber	15 "
Pickled salmon	400 tierces.
Salmon in tins	30,000 lbs.
Pickled herring	700 bbls.
Pickled trout	40 "
Pickled mackerel	200 "
Dried caplin	160 "

EXPORTS BY TRADERS ON LABRADOR COAST FOR YEAR ENDING JULY 1, 1880 (ESTIMATED QUANTITIES).

Dried codfish	526 qtls.
Cod oil	14 tuns.
Pickled salmon	757 tierces.
Pickled herring	2,612 bbls.
Pickled mackerel	30 "

"The foregoing statement shows that in that year the total export of dried codfish was 407,962 quintals—value, at three dollars per quintal, $1,223,886; the export of herring 20,282 barrels—value, at three and a half dollars per barrel, $70,987; the export of salmon 1,749 tierces, —value $34,980.

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"For the year ending 31st July, 1881, the exports of the three great staples were as follows :—

Dried codfish	419,997 qtls.
Pickled herring	33,330 bbls.
Pickled salmon	957 tierces.

"It must be remembered that the foregoing figures represent only the exports of the fishery products, and do not show the quantities consumed by the fishermen while employed, or afterwards during the winter at their own homes, which must be very considerable. Besides, about a fourth of the whole catch is sent to Newfoundland for shipment, and the Canadian and American fishermen who frequent these shores carry away with them the products of their labors, which are estimated to be about a ninth of the entire quantities taken."

To show how precarious and uncertain the Labrador fisheries are still, I quote from the following letter from J. W. Collins, Asst. U. S. Commissioner of Fish and Fisheries, under date of Oct. 27, 1887, in answer to my letter of inquiry: "During last July and August I made a cruise in the Fish Commission schooner *Grampus* to the Gulf of St. Lawrence, around the south and east coasts of Newfoundland, through the Strait of Belle Isle, and thence to Mingan. I learned that the cod fishery on the east coast of Newfoundland (particularly that portion known as the 'French Shore,' from Cape St. John to Cape Bauld) and at the Labrador has been bad for the past two or three years. But it was worse this year than ever. As late as July 26th I met Capt. George Manuel, of the mail steamer *Plover*, at Twillingate. He was then direct from the Labrador coast, and reported

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the cod fishery in a very bad condition, the boats having taken only from five to thirty quintals each at the different harbors. Ice was packed in on the coast, and none of the vessels had got beyond Battle Harbor.

"August 1st the average catch of cod on the northeast coast of Newfoundland—Cape Freels to Cape Bauld —did not exceed a single quintal of marketable fish, and in many places was less than half this amount.

"On August 4th I talked with the crew of the schooner *Edward Rich*, of Catalina, Newfoundland. She had been fishing in the Strait of Belle Isle, and was then at Cape Norman. She had a crew of ten men and had taken only one hundred and twenty quintals of cod up to that date.

"Newspaper accounts, which I saw at a later date, stated the Labrador fishery had been a failure this year.

"No American vessels have engaged in the Labrador fisheries since 1880, so far as we are informed; and then only a single vessel went there. Unless there is a marked improvement in the cod fishery of that region, I believe it will not be long before vessels will stop going there. Already the Nova Scotian and Newfoundland fishermen are changing their summer trips from the Labrador to the outer banks."

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CHAPTER XIII.

THE LABRADOR ESKIMOS AND THEIR FORMER RANGE SOUTHWARD.

It is not my purpose to give a detailed account of the Labrador Eskimos, but simply to put together what I have found in relation to them in works referring to Labrador, and to add a few notes made during the two summers spent on that coast in 1860 and 1864. Although I was aware that the Eskimos formerly lived as far south as the southern entrance to the Strait of Belle Isle, where I saw two individuals in 1860, one said to be a full-blooded Eskimo woman, I regarded them as stragglers from the north. It now seems more probable, from the Rev. Mr. Carpenter's statement, in a subsequent page, and from the fact, to be hereafter stated, that several hundred Eskimos lived at Château Bay, opposite Belle Isle, in 1765, while others were known to have extended as far east as the Mingan Islands, that this race had a more or less permanent foothold on the northern shores of the Gulf of St. Lawrence. If this was so, it seems not improbable that this roving race may have made, in very early times, expeditions farther south to Nova Scotia and New England. Here also comes to mind the theory of Dr. C. C. Abbot, that the Eskimos formerly inhabited the coast of New Jersey during the river-terrace epoch.

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Although at first disposed to reject such an assumption, the examination we have made leads us to look with more favor upon Dr. Abbot's theory, and to think it not improbable that long after the close of the glacial period, i.e., after the ice had disappeared and during the early part of the terrace epoch, when the reindeer and walrus lived as far south as New Jersey, the Eskimos, now considered so primitive a race, possibly the remnants of the Palæolithic people of Europe, formerly extended as far as a region defined by the edge of the great moraine; and as the climate assumed its present features, moved northward. They were also possibly pushed northward by the Indians, who may have exterminated them from the coast south of the mouth of the St. Lawrence, the race becoming acclimated to the arctic regions. All these hypotheses came up afresh in our mind a few summers ago when we began to collect these notes. Their substantiality became more pronounced after reading the confirmatory remarks made by Professor E. B. Tylor at the Montreal meeting of the British Association. We are not now, however, prepared to adopt the view that the Norsemen did not go as far south as Narragansett Bay, and that the natives they saw were not red Indians, their word "skrellings" being indiscriminately applied to any of the native tribes they saw.

We do find, however, unexpected confirmation of Professor Tylor's supposition that "Eskimos eight hundred years ago, before they had ever found their way to Greenland, were hunting seals on the coast of Newfoundland, and caribou in the forest," for these events did actually happen in Newfoundland, or at least there are traces of Eskimo residence in large numbers at Château

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Bay in 1765, of their repeated crossing over to Newfoundland, and of their learning a few French words from the French settlers.

At all events the facts we here present should induce our New England and Canadian archæologists to make the most careful examination of the shell-heaps about the mouth of the St. Lawrence and on the shores of northern and southern Nova Scotia, as well as of Maine and northern Massachusetts, for traces of early Eskimo occupation.

Certain facts seem to confirm the early belief of the Greenland Danes and Moravians that the Labrador Eskimos were an older people than those who migrated into Greenland. In the extracts from the appendix to Cranch's History of Greenland given farther on, we shall see that the Eskimos of these two regions differed in their dress and kayaks, differences we have personally noticed.

Whether the Labrador Eskimos belong to an older stock than those living directly north of Hudson's Bay we cannot say. Crantz, however, remarks: "As early then as the year 1800 our missionaries learned from the reports of Northlanders who visited their settlements that the main seat of the nation was on the coast and islands of the north, beyond *Cape Chudleigh*." Crantz, in a note (xvi), also claims: "There can be no hesitation in affirming that Greenland was peopled from Labrador, not Labrador from Greenland."

The theory that the Eskimos entered America by way of Behring Strait, now generally received,* was thus stated by Crantz in 1767: "Our Greenlanders, it should seem, having settled in Tartary after the grand dispersion of

* Mr. Dall and others do not, however, accept this view.

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the nations, were gradually impelled northward by the tide of emigration, till they reached the extreme corner of Kamtschatka, and finding themselves disturbed even in these remote seats, they crossed the strait to the neighboring continent of America. . . . Our savages then retired before their pursuers across the narrow strait, either by a direct navigation or by a more gradual passage from island to island, to America, where they could spread themselves without opposition through the unoccupied wastes round the southeast part of Hudson's Bay, or through Canada up to the northern ocean. And here they were first met with in the eleventh century by the discoverers of Wineland. But when they were compelled to evacuate these possessions likewise, by the numerous tribes of Indians superior to themselves in strength and valor, who thronged to the north out of Florida, they receded nearer to the pole, as far as the 60th degree. Here Ellis in his voyage to Hudson's Bay found the Esquimaux,* resembling the Greenlanders in every particular of dress, figure, boats, weapons, houses, manners, and customs. . . . The clerk of the *California* † says that these Esquimaux are grievously harassed by the Indians inhabiting the south and west shores of Hudson's Bay, who are in all respects a distinct race. An unsuccessful hunting or fishing expedition is a sufficient pretext for their oppressors to fall upon them and take them prisoners or murder them. These acts of violence have induced the fugitives to retreat so far to

* Charlevois derives this name from the Indian word *Eskimautsik*, which in the language of the Abenaquis signifies *to eat raw;* and it is certain that they eat raw fish. (They also eat seals and birds raw.)

† Account of a voyage for the discovery of a northwest passage, vol. ii. p. 43.

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the northward ; and part of them in all probability passed over to Greenland in the fourteenth century, either crossing Davis's Strait in their boats from *Cape Walsingham* in lat. 66° to the South Bay, a distance of scarcely forty leagues, or otherwise proceeding by land round the extremity of Baffin's Bay, where, if we may trust the reports of the Greenlanders, stone crosses, like guide-posts, are still to be seen at intervals along the coast."

That the Eskimos were more abundant on the eastern shores of Hudson's Bay may be proved by the following extracts from Coats's Notes on the Geography of Hudson's Bay, reprinted by the Hakluyt Society.* It appears from his notes that the Eskimos inhabited Labrador from the Gulf of St. Lawrence around to James's Bay, i.e., as far south in Hudson's Bay as Belcher's Island (lat. 56° 6′) and the Sleepers. Their southern range was probably Hazard Gulf, in lat. 56° 22′. The coast of Hudson's Bay is wild and barren, with floating ice. Speaking of the barren, treeless coast from Cape Diggs to Hazard Gulf, Coats says: "Doubtless the native Usquemows know the time and seasons of those haunts, and nick it, for we found vestiges of them at all the places we stopt att." From the foregoing extract it is obvious that Captain Coats obtained his knowledge of the Labrador Indians and the Eskimos from his personal observations and inquiries while in Hudson's Bay ; he personally only by hearsay received information that the Eskimos, by whalers called "Huskies," lived as far south as St. Lawrence Bay ; but his statement will be seen to

* Notes on the Geography of Hudson's Bay, being the remarks of Capt. W. Coats in many voyages to that locality between the years 1727 and 1751. Edited by John Barrow. London, Hakluyt Society, 1852. 8vo.

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be confirmed by Crantz. The northern Indians mentioned by Coats are undoubtedly the Naskopies.

The following extracts from the appendix to Crantz's History of Greenland, English translation, fully prove that several hundred Eskimos spent the summer at Château Bay opposite the northeastern extremity of Newfoundland, and also crossed over to the latter island, and must have been, for several years at least, residents on the shores of the Strait of Belle Isle. The first visit of the Moravians to the Labrador coast was in 1752; Christian Erhard, a Dutchman, but a member of the Moravian Society, landed in July in Nisbet's Haven, with a boat's crew of five men, at a point north of this harbor, where all were murdered by the Eskimos, the vessel returning to England. The next attempt to approach the Eskimos was made in 1764, by Jens Haven, who had labored for several years as a missionary in Greenland, and had recently returned with Crantz to Germany. With letters of introduction to Hugh Palliser, Esq., the governor of Newfoundland, in May of the same year he arrived at St. Johns; "but he had to meet with many vexatious delays before he reached his destination, every ship with which he engaged refusing to land for fear of the Esquimaux. He was at length set on shore in Château Bay, on the southern coast of Labrador; here, however, he found no signs of population except several scattered tumuli, with the arrows and implements of the dead deposited near them. Embarking again he finally landed on the island of Quirpont or Quiveron, off the northeast extremity of Newfoundland, in the Strait of Belle Isle, where he had the first interview with the natives." "The 4th September," he writes in his journal,

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"was the happy day when I saw an Esquimau arrive in the harbor. I ran to meet him and addressed him in Greenlandic. He was astonished to hear his own language from the mouth of an European, and answered me in broken French." The next day eighteen returned his visit. On the third day the Eskimos left the harbor altogether, and after a short stay at Quirpont Haven returned to Newfoundland.

The following year Haven, with three other missionaries, landed, July 17, 1765, in Château Bay, lat. 52°, on the south shore of Labrador, opposite Belle Isle. "Here the party separated; Haven and Schlötzer engaging with another vessel, to explore the coast northwards; they did not, however, accomplish anything material in this expedition, nor did they meet with a single Esquimau the whole time. Drachart and John Hill remained in Château Bay, and were fortunate enough to have the company of several hundred Esquimaux for upwards of a month, during which period they had daily opportunities of intercourse. As soon as Sir Thomas Adams had received intelligence that they had pitched their tents at a place twenty miles distant, he sailed thither to invite them, in the name of the governor, to Pitt's Harbor. On the approach of the ship the savages in the kajaks hailed them with shouts of 'Tout camarade, oui Hu!' and the crew returned the same salutation. Mr. Drachart did not choose to join in the cry, but told Sir Thomas that he could converse with the natives in their own language. When the tumult had subsided he took one of them by the hand and said in Greenlandic, 'We are friends.' The savage replied, 'We are also thy friends.'"

Crantz then describes, from the notes of Haven and

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Drachart, the peninsula of Labrador and some of the animals as well as the habits of the Eskimos. These people remained at Château Bay through the summer until at least after the middle of September, as on Sept. 12th and 13th the shallop ran ashore, and the Eskimos invited them to lodge in their tents, carrying the missionaries ashore on their backs.

The following extract shows that the Eskimos must, before the year 1765, have been in the habit of crossing the Strait of Belle Isle and landing on Newfoundland:

"The governor wished to prevent them from crossing over to Newfoundland, where, according to their own account, they procured a certain kind of wood not to be found in their country, of which they made their darts. But since they interpreted this prohibition as a breach of peace, it was rescinded on their promise to commit no depredation on the fishing-vessels they might meet with on the way; to which engagement they scrupulously adhered."

The account then goes on to say that during the interval which occurred between the visit of Haven and Drachart in 1765 and the foundation of the first missionary settlement at Nain in 1771, "the old quarrels between the natives and the English traders were resumed; and as no one was present who could act as interpreter and explain the mutual grounds of difference, the affair terminated in bloodshed. Nearly twenty of the natives were killed in the fray, among whom was Karpik's father; he himself, with another boy and seven females, were taken prisoners and carried to Newfoundland. One of these women, of the name of Mikak, and her son, were brought to England, where they recognized an ac-

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quaintance in Mr. Haven, who had formerly slept a night in their tent. Karpik was detained by Governor Palliser, with the intention of committing him to the care of Mr. Haven, to be trained up for usefulness in a future mission to his countrymen. He did not arrive in England till 1769, at which time he was about fifteen years old." He died in England of small-pox.

We glean a few more items from Crantz regarding the distribution, numbers, and habits of the Labrador Eskimos. The Moravians, after founding Nain (lat. 56° 25′), determined to found two other stations, one to the north and the other to the south. Okkak (150 miles north of Nain in lat. 57° 33′) was thus founded on land purchased from the Eskimos in 1775, Haven with his family establishing himself there the following year. The reason for founding these stations was due to the fact that it "was found insufficient to serve as a gathering place for the Eskimos dispersed along a line of coast not less than six hundred miles in extent, especially as it afforded but scanty resources to the natives during the winter season, when they had fewer inducements to rove from place to place."

In the summer of 1782 the Moravians began a third settlement to the south, "on the spot which they had formerly marked out and purchased from the Esquimaux. This station received the name of Hopedale." As obstacles to the missionary work were the following: "The spirit of traffic had become extremely prevalent amongst the southern Esquimaux; the hope of exaggerated advantages which they might derive from a voyage to the European factories, wholly abstracted their thoughts from religious inquiries; and one boat-load followed another

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throughout the summer. A Frenchman from Canada, named Makko, who had newly settled in the south, and who sustained the double character of trader and Catholic priest, was particularly successful in enticing the Esquimaux by the most tempting offers. Besides the evil consequences resulting from these expeditions in a spiritual point of view, so large a proportion of their wares was thus conveyed to the south that the annual vessel which brought out provisions and other necessaries for the brethren, and articles of barter for the natives, could make up but a small cargo in return, though the brethren, unwilling as they were to supply this ferocious race with instruments which might facilitate the execution of their revengeful projects, furnished them with the firearms which they could otherwise, and on any terms, have procured from the south."

Crantz then mentions a feature of Eskimo life which, however repugnant to the feelings of the Moravians, is of interest to the ethnologist, and has not, so far as we are aware, been observed among the Eskimos of late years. This was the erection of a temporary winter éstufá or public game-house. "A *kache*, or pleasure-house, which, to the grief of the missionaries, was erected in 1777 by the savages near Nain, and resorted to by visitors from Okkak, has been described by the brethren. It was built entirely of snow, sixteen feet high and seventy feet square. The entrance was by a round porch, which communicated with the main body of the house by a long avenue terminated at the farther end by a heart-shaped aperture, about eighteen inches broad and two feet in height. For greater solidity the wall near the entrance was congealed into ice by water poured upon it.

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Near the entry was a pillar of ice supporting the lamp, and additional light was let in through a transparent plate of ice in the side of the building. A string hung from the middle of the roof, by which a small bone was suspended, with four holes driven through it. Round this all the women were collected, behind whom stood the men and boys, each having a long stick shod with iron. The string was now set a-swinging, and the men, all together, thrust their sticks over the heads of their wives at the bone, till one of them succeeded in striking a hole. A loud acclamation ensued; the men sat down on a snow seat, and the victor, after going two or three times round the house singing, was kissed by all the men and boys; he then suddenly made his exit through the avenue, and, on his return, the game was renewed."

The narrative then goes on to state that "one of the objects of the establishment at Hopedale had been to promote an intercourse with the red Indians who lived in the interior, and sometimes approached in small parties to the coast. A mutual reserve subsisted between them and the Esquimaux, and the latter fled in the greatest trepidation when they discovered any traces of them in their neighborhood. In 1790, however, much of this coldness was removed, when several families of these Indians came to Kippokak, an European factory about twenty miles distant from Hopedale. In April, 1799, the missionaries conversed with two of them, a father and son, who came to Hopedale to buy tobacco. It appeared that they were attached to the service of some Canadians in the southern settlements, as well as many others of their tribe, and had been baptized by the French priests. They evidently regarded the Esquimaux with

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alarm, though they endeavored to conceal their suspicions, excusing themselves from lodging in their tent on account of their uncleanly habits. At parting they assured the brethren that they would receive frequent visits from their countrymen, but this has not as yet been the case."

From Cartwright's "Journal of a Residence in Labrador" we glean the following statements, which certainly confirm those of the Moravians: In 1765 a blockhouse was erected in a small fort at Château Bay to protect the English merchants from the Eskimos. (Cartwright also gives the best account we have seen of the Bethuks of Newfoundland.) The southern tribe of Eskimos were at Château Bay in 1770, Cartwright observing that some Moravians were there at the same time. He also states that there was an Eskimo settlement "some distance to the northward" of Cape Charles, and that a family of nine Eskimos came to spend the winter, living near Cartwright's house, and more Eskimos came to join them in July, 1771, there being thirty-two in all; they traded whalebone with the Eskimos to the northward.* Cartwright saw deserted Eskimo winter houses near Denbigh Island.

In 1771 he saw an Eskimo pursuing a "penguin" in his kayak near Fogo Island, off the coast of Newfoundland!

* That the French in 1753 traded with the Eskimos for whalebone and oil is shown by the following extract from Jeffrey's Northwest Passage, p. 147: "The Eskemaux go up to Latitude 58, or further North; there leave their great Boats, pass a small Neck of Land, taking their Canoes with them, and then go into another Water which communicates with Hudson's Streights, carry their Return of Trade into Eskemaux Bay, where they live in Winter; and the French made considerable Returns to Old France, by the whalebone and oil procured from these People."

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August 30, 1772, "500 or thereabouts" Eskimos arrived at Charles's Harbor from Château Bay to the southward, to meet their relations from London, whom Cartwright had the year previous taken with him to London, some of them having died in England of the small-pox. In April and May, 1776, Eskimos were observed living near Huntington Island. Many Eskimos died in Ivuktoke Inlet, probably from the small-pox, brought over from England. Cartwright also reports seeing Eskimos at Huntington Island in 1783, also at Château Bay, where they were observed in 1786.

The foregoing extracts abundantly prove that the Eskimos repeatedly crossed to Newfoundland, residing, during the summer at least, on the outer islands opposite Belle Isle. No reference is made to the former presence of the Eskimos in Newfoundland. It is not improbable that there was at least a slight intercourse between the Bethuks, the aborigines of Newfoundland, said to be a branch of the Algonkins, and found to be in possession of the island by Cabot in 1497. A stone vessel dug up with other Bethuk remains is described as "an oblong vessel of soft magnesian stone, hollowed to the depth of two inches, the lower edges forming a square of three and a half inches in the sides. In one corner is a hollow groove, which apparently served as a spout."* If this is, as has been suggested to us by Professor Tylor, attributable to the influence of Eskimo art, the style may have been suggested by the possible intercourse of these aborigines with the wandering Eskimos.

* Newfoundland, its history, its present condition, and its prospects in the future. By Joseph Hatton and the Rev. M. Harvey, Boston, 1883, p. 169. See also Mr. Lloyd's paper, Journal of the Anthropological Institute of Great Britain and Ireland.

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In connection with the subject of the relations between the Indians of Newfoundland and the Labrador Eskimos, may be cited the following statement of that industrious historian, the late Jesuit, Father Vetromile. In an article entitled "Acadia and its Aborigines,"* he says: "The Etchimins, Micmacs, and Abenakis are very often considered as one nation, not only on account of the similarity of their language, customs, suavity of manners, and attachment to the French, but also for their league in defending themselves against the English. Although the Micmacs are generally somewhat smaller in size than the other Indians of Acadia and New France, yet they are equally brave. They have made a long war against the Esquimaux (eaters of raw flesh), whom they have followed and attacked in their caverns and rocks of Labrador.† Newfoundland must have several times been

* Collections of the Maine Hist. Soc., vii., pp. 339–349. 1876. Communicated Jan. 16, 1862.

† Father Vetromile evidently takes this statement from Charlevoix, who in his Histoire générale de la Nouvelle France, i., p. 124. remarks after speaking of the Micmacs of Acadia: "Ils ont fait lontems une cruelle guerre aux Esquimaux, et pour les aller attaquer jusques dans leurs Cavernes, et sur leurs Rochers, ils ne craignoient point de faire trente à quarante lieuës en Mer, dans leurs Canots d'écorce." That Newfoundland was the field of hard wars between the Micmacs and Eskimos, seems to be a pure assumption on the part of Vetromile. Charlevoix, however, on p. 421, vol. i., of his Histoire, remarks: "On n'a jamais vû sur ses Côtes, que des Eskimaux, qui y passent de la grande Terre de Labrador, pour chaffer, et pour faire la Traitte avec les Européens; mais ces Sauvages ont souvent parte d'autres Peuples, avec qui ils sont en commerce."

In vol. iii. p. 178, again discoursing of the Eskimos of Newfoundland, Charlevoix remarks: "Ce qui est certain, c'est qu'on n'y a jamais vû que des Eskimaux, qui n'en sont pas originaires. Leur véritable Patrie est la Terre de *Laborador*, ou *Labrador;* c'est la du moins, qu'ils passent la plus grande partie de l'année; car ce seroit, ce semble, profaner le doux nom de Patrie, que de le donner à des Barbares errons, qui ne s'affectionnent à aucun Pays, & qui pouvant à peine peupler deux ou trois Villages, embrassent un Terrein immense. En effet, outre les Côtes de Terre-Neuve, que les Eskimaux parcourent pen-

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the field of hard wars between the Micmacs and Esquimaux; the latter were always chased by the former" (p. 339).

Nearly all the extracts we have made tend to show that the Eskimos were generally driven northward by the Indians and confined by them to their natural habitat, the treeless regions of arctic America, whither the Indians themselves did not care to penetrate.

In 1811 two Moravian missionaries* explored the northern coast of Labrador from Okkak to Ungava Bay, making an excellent map of this part of the coast. The expedition arose from their desire to establish missions where the Eskimos were abundant, as farther down the coast they were regarded as "mere stragglers."

An Eskimo tradition of interest is mentioned in this book, as follows: "July 24th. Amitok lies N. W. from Kummaktorvik, is of an oblong shape, and stretches out pretty far towards the sea. The hills are of moderate height, the land is in many places flat, but in general destitute of grass. On the other side are some ruins of Greenland [Eskimo] houses.

"The Esquimaux have a tradition that the Green-

dant l'Eté, dans tout ce vaste Continent, qui est entre le Fleuve Saint-Laurent, le Canada, & la Mer du Nord, on n'a encore vû que des Eskimaux. On en a même trouvé assez loin en remontant le Fleuve *Bourbon*, qui se décharge dans la Baye d'Hudson, venant de l'Occident."

Nuttall, in his Manual of Ornithology, Water Birds (Boston, 1834), speaking of the great auk, says: "Many are said to breed on the desert coasts of Newfoundland, where they have been seen by navigators, though not recently. According to Pennant, the Esquimaux, who frequented this island, made clothing of the skins of these birds."

* Journal of a voyage from Okkak, on the coast of Labrador, to Ungava Bay, westward of Cape Chudleigh, undertaken to explore the coast and visit the Esquimaux in that unknown region. By Benj. Kohlmeister and George Knoch, missionaries of the Church of the Unitas Fratrum. London, 1814, 8vo, pp. 83.

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landers [i.e., Greenland Eskimos] came originally from Canada, and settled on the outermost islands of this coast, but never penetrated into the country before they were driven eastward to Greenland. This report gains some credit from the state in which the above-mentioned ruins are found. They consist in remains of walls and a grave, with a low stone enclosure round the tomb, covered with a slab of the same material. They have been discovered on islands near Nain, and though sparingly, all along the whole eastern coast, but we saw none in Ungava Bay."

The following extracts from Robinson's "Notes on the Coast of Labrador,"* throw some further light on the early occupation of southern Labrador and eastern Canada by the Eskimos:

"The Esquimau tradition concerning the Norsemen is clear enough: that they were a gigantic race, of great strength—were very fierce, and delighted to kill people—that they themselves could not be killed by either dart or arrow, which rebounded from their breasts as from a rock. The Esquimaux suppose these giants still to exist, only very far north." (Page 28).

"When the French first frequented the coast, it was in possession of the Esquimaux up as far as the west end of Anticosti. It appears that they had not been long in possession before the arrival of the Europeans, and that they had got it by conquest. During the time they held the coast, it would seem, the Esquimau country was the *champ d'honneur* of all the tribes of Indians from New England and the Lakes to Hudson's Bay. Mic-

* Trans. Lit. and Hist. Soc., Quebec, iv. i. Feb., 1843.

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macs and Abinaquis, from Nova Scotia and Maine; Iroquois, from lakes Champlain and Ontario; Algonquins and Nascopies, north of the St. Lawrence—all sent their war parties against the Esquimaux: as to their immediate neighbors, the Mountaineers, a continual war raged between them.

"Notwithstanding all these enemies, the Esquimaux maintained their conquests with a strong hand, and, it is probable, would have progressed farther south if the Europeans had not arrived. No account of their numbers has come down to us; yet from various items it would appear to be seventy thousand. When De Monts first settled Port Royal in Nova Scotia in 1605, he was surprised with the appearance of an Indian army near his settlement, of four hundred men, who had just returned from an expedition against the Esquimaux. It would seem by this that the parties who ventured into the Esquimau country were numerous" (pp. 42, 43).

"I have said that they maintained their conquests along the Gulf shore until about the year 1600, when the Mountaineers, having received firearms from the French, and learned the use of them, this soon turned the scale, as it does everywhere else, and the Esquimaux were forced to give ground, retiring downwards to the Straits, and concentrating themselves on Esquimaux Island, about one mile from the house of the late Mr. N. Lloyd, of St. Paul's. There they fortified themselves in a camp, with walls composed of stone and turf, with a ditch outside, in circuit more than half a mile, which remains almost entire to this day. In this fort they maintained themselves till about the year 1640, when they were assaulted by the Mountaineers aided by the French,

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and either totally extirpated or expelled; the few that escaped returning to the north, outside of the Strait of Belle Isle. In this assault, it is said, more than 1,000 were slain, and by the quantity of human bones scattered over the island I should think the number was not overrated. After their expulsion from the Gulf shores they occasionally made predatory excursions against the French—coming into the Straits, early in the spring, in skin-boats—burning fishing-rooms, boats, etc., killing the guardians or making them fly. Twice they assaulted Bradore during the times of the Courtemanches, in one of which they lost four hundred men: indeed, they continued this warfare until three years before the conquest; when, after destroying several fishing-stands along the Straits, they were repulsed by some sealing crews at Pennoyer River (pp. 45, 46).

The following extract from Arthur Dobbs's "An Account of the Countries adjoining to Hudson's Bay" (London, 1744) throws light on the struggle for existence on the East Main, nearly two centuries ago, between the red Indians and the Eskimos:

"The East Main from Slade River to Hudson's Streight is least known, there being no factories fixed there for Trade, altho' the best Sable and black Fox skins are got there. Here the *Nodway* or *Eskimaux Indians* live, who are in a manner hunted and destroyed by the more southerly *Indians*, being perpetually at war with each other."

The stone structures, particularly the grave or dolmen-like burial-places referred to by the Moravians, are of course matters of very great interest. In connection with that statement we would draw attention to the fol-

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lowing extract from "The three voyages of Martin Frobisher," second voyage, 1577, Hakluyt Society, London, 1867, p. 136:

"In one of the small islands here [near Lecester's Iland in Beares sound] we founde a tombe, wherein the bones of a dead man lay together, and our savage being with us and demanded (by signes) whether his countryman had not slain this man and eat his flesh so from the bones, he made signes to the contrarie, and that he was slain with wolves and wild beastes."

Although it is generally stated that the Eskimos seldom if ever bury their dead, the foregoing statement would show that in early times at least they took pains to place the corpse in stone tombs. I found at Hopedale, in 1864, two skeletons, evidently Eskimo, interred in the following manner: while walking over a high bare hill northeast of the station I discovered a pole projecting from what seemed a fissure in the rock; it proved to be the sign of an Eskimo grave; the pole projected from the chasm, which was about fifteen inches wide and twenty or twenty-four inches in depth; the opening was covered by a few large stones laid across the fissure. At the bottom lay the remains of two skeletons entirely exposed to the elements, with no soil over them. The skulls were tolerably well preserved, and so were the long bones, but the vertebræ, ribs, etc., had mostly decayed. Judging by the way in which such objects are preserved in the open air on this coast, the burial must have been made at least over half a century ago, but more probably from one to three centuries since.

Mr. Holme found on Eskimo Island, twelve miles west of Rigolet, about seventy graves. "These graves

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were made in the ordinary Eskimo custom, not being underground, although the soil was by no means deficient, but consisting of rough unhewn blocks of stone heaped together in an oblong form, the inside measurements being 2 feet by 1½ feet. Many of them had been disturbed by bears or wolves, but in most of them a skull and bones were lying.*

We now glean the following extracts from Hind's excellent Explorations in the Interior of the Labrador Peninsula, which show that the Eskimos spread southwestward along the coast of Labrador as far as the Mingan Islands.

Speaking of the Montagnais or coast Indians of Labrador, he writes: "Of their wars with the Mohawks to the west, and the Esquimaux to the east, between two and three hundred years ago, there not only remain traditions, but the names of many places in the Labrador peninsula are derived from bloody battles with their bold and cruel enemies, or the stolid and progressive Esquimaux" (ii. p. 11).

"The summit of the Great Boule, seven hundred feet above the sea, and the brow of the bold peninsula on the west side of the harbor [Seven Island Bay] were two noted outlooks in the good old Montagnais times. They are not unfrequently visited now, when the Indians of the coast wish to show their country to the Nasquapees from the interior, and to tell them of their ancient wars with the Esquimaux. . . . They were able to hold their own against the Esquimaux in consequence of the almost exclusively maritime habits of the people, who rarely as-

* Proc. Roy. Geographical Soc., April, 1888, p. 193.

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cended the rivers farther than the first falls or rapids; and they fearlessly pursued their way through the interior of the country as far as the Strait of Belle Isle and Hamilton Inlet, but exercising the utmost caution as they approached the sea to hunt for seals" (p. 30).

Of the Mingan Islands Esquimaux Island was so named "because the Esquimaux were wont to assemble there every spring in search of seals," etc., etc. (p. 49).

"The ruins of Brest must not be confounded with those of the old Esquimau fort some distance farther up the straits, and which are found on Esquimaux Island in St. Paul's Bay. These ruins, consisting of walls composed of stone and turf, remain almost entire to this day;* and on the same island are large numbers of human bones, the relics of a great battle between the Montagnais and French on one side and the Esquimaux on the other, which were found about 1840" (p. 130).†

"At Fox Harbor there is a small settlement of Esquimaux, who are now orderly and industrious Christian people, fruits of the faithful labors of the missionary at Battle Harbor, who has resided eight years on the coast" (p. 198).

"Seals have been the chief cause of the wars between the Montagnais and Esquimaux of the Labrador peninsula, and most of the conflicts between these people have taken place at the estuaries of rivers known to be favorite haunts of the seal" (p. 204).

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* Robertson of Sparr point.

† In an interesting map in Charlevoix's Histoire, vol. i., facing p. 418, the site of Brest is indicated by "Fort Ponchartrain," while the "old Esquimaux fort" of Hind is on this map called "Vieux Fort," and is situated on the west side of the mouth of Eskimo River, at the mouth of which is the "I. des Esquimaux" of Charlevoix.

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Regarding the Eskimos living near Caribou Island, at the mouth of Esquimaux River, Strait of Belle Isle, in 1860 and several years after that date, the following information has been kindly given me by the Rev. C. C. Carpenter, for some years (1858 to 1865) a missionary to this part of the Labrador coast: "Concerning the Esquimaux ('Huskemaw,' old father Chalker at Salmon Bay used to call them), in my time there was only one family living in the immediate vicinity of the mission, and that only a fragment—the Dukes family. They once lived at the extremity of Five League Point. The husband (George?) died and the wife married an Englishman, old Johnny Goddard. She was a full-blooded Esquimau, and could kill a seal by imitating its appearance in dress and cry, just as quick as the next man, and a good deal quicker if the other was white! She died at a great age about the year 1879. I was on the coast, after an absence of fifteen years, in 1880, and was told that she was about 100 years old, but I deemed that an exaggeration. Her sons were George and Andrew, both now dead of consumption. I buried George at Middle Bay in 1862. Andrew died since we came away. He had visited Halifax and had had his photograph taken; I have a copy of it; it is, however, of a dressed-up man, not my old Esquimau friend. Both of the sons were unmarried. A daughter of old Aunt Jenny Goddard had a daughter, I think by an American sailor. She was called Lucy Dukes, and (her mother dying) was adopted by Mrs. Goddard. I dare say you remember her there at Stick Point Island; she was lame. She married little Johnny Goddard, nephew of old John, and they with several children occupy the island home.

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She said to me in 1880, 'There's my Jenny, just look at her narrow features; you know Granny had a very narrow face!' And yet an old sailor once said that the old woman's face was as flat as a barn-door!

"There was another family of Esquimaux, whose residence was at St. Augustine; I cannot recall the surname. I used to see one, 'Louis the Esquimau.' My impression is that one only of that family was living in 1880, for I brought home Esquimau dolls in full dress made by her. These I feel sure were all the remnants living in my parish, say for fifty or a hundred miles up and down the coast.

"The Esquimaux in Southern Labrador are a remnant. Once powerful there and numerous, they were defeated in a battle fought on Esquimaux Island (at the mouth of the river) by the Indians (Mountaineers), and what few were left went northward."

We observed on Caribou Island traces of Eskimo occupation in the form of a circle of stones, like that observed farther north near Strawberry Harbor.

Along the coast north of Hamilton Inlet are a few Eskimos, half-breeds and probably remnants. At Roger's Harbor we took aboard as pilot to Strawberry Harbor one Cole, a half-breed, part Eskimo and part Englishman, who had an Eskimo wife and two three-quarters-breed children; his mother was an Eskimo. There were formerly a few Eskimos living in this region, but they had died off rapidly within a few years past; our pilot from the States, Captain French, who had frequented this coast for many years, said that there was now but one Eskimo where there used to be twenty. Their disappearance seems due partly to that of seal, fish, birds, and

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other game, and partly to contact with the civilization of this coast, their close winter houses inducing consumption and other chest troubles; but whatever the causes, the race is rapidly fading away, going by entire families. Cole was intelligent and could read and write.

On our way to Strawberry Harbor we were boarded by an Eskimo who paddled up to our vessel in his kayak. He had been living in the bay during the summer. The next day I landed on a little flat islet near our harbor, and found traces of recent Eskimo occupation. An Eskimo family had evidently been summering there in a sealskin tent. The marks of their temporary sojourn were the circle of water-worn stones which had been used to pitch the tent, the feathers and bones of sea-fowl which had been shot or snared, scattered bones of the seal, and other unmistakable signs of Eskimo occupancy and of Eskimo personal uncleanliness. While here we learned that some Eskimos were spending the summer on an island hard by, and we tried to find one to pilot us to Hopedale, but were unsuccessful. We, however, obtained one who had received some education and was then living ten miles up the bay with a Norwegian in the employ of the Hudson Bay Company, his pay being fifty dollars a year.

At the time I visited Hopedale, which was in the summer of 1864, in the expedition of Mr. William Bradford, the well-known artist, the Eskimo population of that station was about two hundred. It was reported to us that during the preceding March twenty-four Eskimos had died of "colds;" while at Okkak twenty-one had died, and the same number at Nain. Thus over a tenth part of the native population at these stations had died of

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chest diseases in a single month. This high death-rate may be the result of their partial civilization and less hardy out-of-door life, but their houses are not very different from those their savage ancestors inhabited. The missionaries have wisely not attempted to force upon them European standards of living as regards dress and houses, and their system of trading with them as well as teaching them does not appear to have been accountable for this rapid decrease. On the contrary, anthropologists as well as humanitarians are under obligations to these devoted Moravians for their success in preserving on American soil this interesting people intact, unmixed, and with some of their harmless and more interesting habits preserved. They are, however, doomed, judging by the past years' experience, to ultimate extinction.

The Eskimo settlement of Hopedale, the only one we visited, was founded in 1782. It consisted in 1864 of about thirty-five houses, arranged with more or less disorder in three principal streets. They are mostly built of upright spruce logs with the bark still on, dovetailed at the corners and banked nearly to the eaves with turf on the outside; the roof rather flat, though irregular, with a skylight and small window in one side, either, as in the case of the more well-to-do families, consisting of a rude sash with four or six glass panes, or panes of the intestines of the seal sewed together.

The house is entered through a long low porch, probably the survival of an ancient style, i.e., the low porch of their snow houses through which their forefathers crept on their hands and knees. On entering we were obliged to stoop low and to circumspectly make our way

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between the carcass of a seal or a codfish, as the case might be, and a vessel of familiar, democratic shape and use, filled with urine, in which the sealskins are soaked before being chewed between the teeth of the housewife, an important step in the process of making or mending sealskin boots; while Eskimo dogs of various sizes and colors blocked the devious way.

Across the end of the interior, which was floored with wood, and in which we could not stand erect, was a wooden bed or seat, a sort of divan, on which sat a woman in spectacles weaving a basket of dried rushes which had been colored blue or red; she nodded a welcome and made us feel quite at home. The other belongings of the house were a hearth or fire-place of a few pebbles situated on one side, a soapstone lamp, which was a flat oblong dish carved out of soapstone, of normal Eskimo design, some knives of European manufacture, needles and thread, while on a shelf we noticed an Eskimo Bible with the owner's name written in a neat hand on the fly leaf. On the whole the interior was neater and less offensive to the eye and nostril than we expected, as was the exterior. Beside the house, on a cross-pole supported by two uprights, rested a kayak, and over other horizontal poles hung drying a black bear's skin or dried codfish, as the case might be. The spaces between the houses were rudely drained, and saving the usual refuse heap at the rear of the house, a dog's carcass, fish bones, and other rejectamenta, there was nothing particularly repulsive, though certainly nothing attractive about the houses. Two families sometimes live in the same house, which is partitioned off simply by a low rail passing through the middle. We do not

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remember seeing any babies, and there seemed to be few children compared to the adults; here as in the arctic regions the Eskimos having small families.

The women's dress differs from that of the Greenland Eskimo in the much longer tails of their jackets, which, as seen in our engraving, nearly reach to the ground; by the Greenlanders it is worn but little longer than the men's; this difference, as seen on p. 247, was remarked by Cranch. Of late years woolen goods have partly superseded sealskin, but the pattern has been retained. Another difference is the form of the kayak; that of the Labrador Eskimo is much broader than the Greenland kayak, and of clumsier build, since the frame of the former is made of spruce; this renders the Labrador kayak perhaps safer.

So far as we could see, the Labrador Eskimos at and north of Hopedale are full-blooded. Our engraving is from a photograph taken by Mr. Bradford, and gives an excellent idea of a Hopedale Eskimo couple with their baby. The faces apparently show no trace of foreign blood, while there is said to be not a full-blooded Eskimo in the Greenland colony, the intermixture with the Danes and Scandinavians in general being thoroughgoing. Few Europeans or Americans had previous to 1864 visited the Labrador coast north of Hopedale, and there the race has been preserved in most cases intact, though there may now be an occasional intermixture with the Newfoundland fishermen, who now go as far as Nain.

As to the number and distribution of the Eskimos north of the Moravian stations, we now have some definite information from Lieut. Gordon's report of the Hudson's Bay expedition of 1884. He says: "I can-

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not help thinking that their numbers have sensibly diminished, inasmuch as we found signs of their presence everywhere; yet except at Port Burwell, Ashe Inlet, and Stupart's Bay, none were met with. About six miles south of Port Burwell [Cape Chudleigh] there are the remains of what must once have been a large Eskimo settlement, their subterranean dwellings being still in a fair state of preservation. At the present time, so far as I can learn, there are only some five or six Eskimo families between Cape Chudleigh and Nachvak.

"Along the Labrador coast the Eskimos gather in small settlements round the Moravian Mission stations; at these places their numbers vary considerably. Nain is reported to be the largest settlement, and its Eskimo population amounts to about two hundred souls" (p. 16.)

The following notes will show how rapidly the Eskimos are diminishing. In an extract in Hind's Labrador, published in 1863, from an article by Rev. L. T. Reichel, it is stated that the number of Eskimos dwelling along the coast, which is about 500 miles in length, "is computed at about 1,500, of whom 1,163 belong to our mission. There are about 200 heathen living to the north of Hebron, and there are said to be others scattered here and there, but their number cannot be considerable, and some are settled at the establishments of the Hudson's Bay Company."

In 1871, in a pamphlet entitled "Die Missionen der Brüder-Unität. I., Labrador," Rev. Mr. Reichel stated that the number of Eskimos is smaller than generally supposed. There are along 500 miles of the north coast scarcely 1,500 souls, of which 1,124 live at the six mis-

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sion stations.* The "heathen" Eskimos north of Hebron scarcely number 200.

A. von Dewitz, in his "An der Kuste Labrador's" (Mesky, 1881), informs us that within the last decade the extinction of the race has rapidly advanced, and that by the end of the century only the last remnants of this people will be surviving. In the southern mission stations almost all the children die early, and in the northern stations the case is not much better. The last census gave scarcely 1,100 as living at the stations, and about 50 in Hamilton Inlet (Aivektok Bay). There are also about 100 "heathen" Eskimos on Cape Chidley, and 200 in Ungava Bay.

Owing to the kindness of the Rev. B. La Trobe, Secretary of the Moravian Missions in London, I have received the following statistics in a letter dated August 30, 1887: "The number of Eskimos at our stations at the beginning of 1886 was as follows: Hebron, 207; Hopedale, 160; Nain, 214; Okkak, 308; Ramah, 71; Zoar, 90; total, 1,050. Including these, we reckon that there are less than 1,500 Eskimos on the strip of coast from Hamilton Inlet (Aivektok Bay) to Ungava. The race is comparatively pure, but there are some half-breeds, for Hudson's Bay Company's employés and other settlers have married Eskimo women. Whilst Christian influences are brought to bear on the increasing number of fishermen and sailors visiting the stations, every barrier is set up against immorality. Thirty years ago the number under charge of our missionaries was about 1,200, I expect purely Eskimos; now it is about the same, including settler families. Zoar was commenced in 1865, and Ramah in 1871."

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It is interesting to note that Reichel gives some facts showing the former (perhaps temporary) occupation by Greenland Eskimos of some of the outer islands of the northern part of the coast. At Kernertulik on Okkak Island is a cave where traces of a Greenlander's house are still to be seen. Javranat, on the mainland near Okkak, is so called from the Greenlander's word Javra, meaning "frightful," in allusion to a tragedy in which many Eskimos perished, having been beaten by the strategy of their Greenland assailants. Reichel also states that in early times the Eskimos were feared on account of their robberies, which were often accompanied by murder and manslaughter, as far down in general as Newfoundland.

Rev. J. J. Curling states: "By the last census in 1884 the number of inhabitants of the coast from Blanc Sablon up to Cape Chudleigh was 4,211. From Hamilton Inlet to Cape Chudleigh there were 1,425, of whom only 60 were Europeans." (Proc. Roy. Geog. Soc., London, x. 193, April, 1888.)

Our imperfect account of the Eskimos of the Moravian settlements may be supplemented by the following remarks translated from Dr. K. R. Koch's excellent article in the "Bremen Geographical Journal" for 1884, as he spent thirteen months at Nain, and had excellent opportunities for observing these people, and obtaining information regarding their life during the different seasons of the year:

"While the marriages of the Eskimos are often childless and the greater number of the children die young, the families of the white settlers are usually very robust, and the children strong and healthy, while the mortality is low. The number of the settlers increases therefore

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from year to year, and by this means they advance farther and farther towards the north. Besides this normal diminution of the Eskimo population, epidemics appear which are mainly introduced through the traffic with the fishing-vessels, and as the result an extraordinarily great percentage die; for example, when the measles broke out about three years ago [1879?] about twenty per cent died.

"The yearly life of the Eskimos is as follows: During the summer, and especially in the hunting season, that is, from May to December, the Eskimos with their families are scattered along the shore at their different fishing-places. After the men return in May from the reindeer hunting, they take their whole families with them to the islands lying near the seashore, to hunt seals. On their return to the northern seas the seals follow the outside edges of the drift ice, and the hunters are often obliged to drive far out in their dog-sledges to reach the seals' course. Hence they wait with their wives and children upon the outer islands until the coast ice has left the bays and straits between the islands. This takes place about the last of June. Then they hasten back in their kayaks to the stations where they have passed the winter months, in order to prepare their large sail-boats, which are generally purchased of the Newfoundland fishermen.* With these they fetch their families, which have in the meanwhile remained at the spring fishing-grounds, and go trout-fishing in the inlets on the river courses. Then

* In 1864 the Eskimos had no sail-boats except one large schooner they built themselves, at Hopedale, and at that date there was little if any communication with the Newfoundland fishermen.

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follows for from three to four weeks the season of the cod fishery.

"As already stated, the codfish appear in such vast quantities that it would be easy for the Eskimos to gather enough provision for the winter for themselves and their dogs, were it not for the innate thriftlessness of the Eskimo, which leads him as soon as, with the fish he has caught, he has paid to the mercantile house the remainder of the debt contracted in the foregoing winter, to again renew his credit, and to forthwith abstain from further fishing, which he might very well carry on until the end of September. In autumn the season of reindeer-hunting again returns, whereupon from November till Christmas-time the Eskimos set out upon the autumnal seal fishery, when they seek to kill them in their kayaks through the thin ice, or to catch them in nets. This mode of hunting is extremely toilsome and dangerous. The temperature of the air is usually at this time far below the freezing point, sinking to from $-10°$ to $-20°$ C. and in December seldom rises above $-20°$ C. In this temperature the Eskimo sits for hours at a time, bound fast in his kayak, paddling back and forth in the bays and straits, wet through by the icy spray of the waves, which at once freezes on his skiff and his clothes. If overtaken by a storm or the darkness of the night he must seek shelter in any station on the coast and there remain through the night watches or await the cessation of the tempest. In like manner must those work who have set their nets. Often on taking up the nets the seals fall out through the meshes, and must, with great pains, be fished out again. Even hauling the net out from the water is in the extreme cold very disagreeable

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work. They take the seals out morning and evening, and in the mean time they either sit concealed on the bank in order to shoot at the creature, or they paddle in their kayaks over the bay with the same object, for all seals killed with guns belong by contract to those who shoot them.

"As soon as the bays and straits are covered with ice, the seal fishery, so far as it is carried on with nets, naturally ceases, and the Eskimos go to hunt those seals which have been shut into the bays by the ice. They often have to go over very unsafe places upon the still thin ice, and hence this mode of hunting is often accompanied by involuntary cold baths.

"About Christmas-time all the Eskimos with their families again assemble in their winter houses at the missionary stations where they are settled. Now comes the time of schooling for the children, and the season of rest and religious duties for the older persons. For more than a hundred years have the missionaries of the United Brethren been active on these shores, and it is owing to their zeal that nearly all the Eskimos (except a few families which live quite far north of Killinek) have been converted. But they have not sought alone to Christianize them, but also to civilize them. I believe that upon the whole coast there is not an Eskimo who cannot read, write, and cipher, although singularly enough they are not, to be sure, particularly given to this last; on the other hand they have an extraordinary memory, and I believe they know well by heart the usual church tunes. Through close personal contact with the missionaries they try to gain information regarding European customs. Every Sunday afternoon they are allowed to

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come to the missionary house, where illustrated papers which have been sent as presents are shown to them. They are especially attracted by music, and whoever plays to them always finds a grateful public; and they are not listeners alone but also play themselves. Thus the organ or harmonicum used in the church service is played by Eskimos in the winter in the presence of the entire brotherhood, and the organ is accompanied by a small orchestra likewise composed of Eskimos."

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CHAPTER XIV.

THE GEOLOGY OF THE LABRADOR COAST.

In its general features the peninsula of Labrador is an oblong mass of Laurentian rocks lying between the 50th and 60th parallels of latitude. It rises abruptly from the ocean as an elevated plateau, forming the termination of the Laurentian chain, which here spreads out into a vast waste of hills and low mountains. Thus, there is, except near Cape Chidley, no well-marked, single chain of mountains rising above spurs of smaller elevations, but simply an interior height of land with isolated peaks, irregular in its course, from which streams take their rise and flow by various directions into the ocean.

This plateau of hills and low mountains rises abruptly on the coast from the ocean to a height of from 500 to 1,000 feet, and inland continues to rise in peaks to a height of from 1,500 to about 6,000 feet until it reaches the water-shed at a distance of 100 to 200 miles from the coast. On the western slope this plateau falls gradually away by an easy descent towards the shores of Hudson's Bay. Dr. Bell states that the northern coast increases gradually northward, "until within seventy statute miles of Cape Chudleigh, where it has attained a height of about six thousand feet above the sea." Thence the elevations or peaks decrease in height to Cape Chidley

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or Chudleigh, where they are fifteen hundred feet in elevation. He adds that the highest land of the Labrador peninsula forms a regular range of mountains parallel to the Atlantic seaboard, this range becoming progressively narrower from Hamilton Inlet to Cape Chidley. (Report for 1884, 10, DD.)

On the south, the coast has a northeasterly trend, following the coast-line of the southern Atlantic border of the continent. From Belle Isle, situated at the mouth of the Strait of Belle Isle, the eastern coast trends in a northwesterly direction to Cape Chidley, thus following the northwesterly trend of the northern Atlantic coast-line of the continent from Cape Race in Newfoundland to the head of Baffin's Bay, near latitude 80°. It thus lies parallel to the western coast of Greenland. The northeasterly trend of the southern coast of Labrador is determined by the same course of the Laurentian range of syenites and gneiss rocks which forms the northern shore of the St. Lawrence Gulf and River. Its northwesterly course beyond the Strait of Belle Isle is likewise determined by a range of syenites and trap-rocks, upheaved in a general N. W. and S. E. direction. Thus the interior plateau of Laurentian gneiss seems surrounded by a framework of igneous rocks, which has apparently preserved to this day the original form and proportions of the Atlantic slope of the azoic nucleus of our continent.

Laurentian Gneiss and Syenite.—Between Little Mecatina Island and Henley Harbor there is a great uniformity in the rocks, which are either wholly gneiss, or more commonly a syenitic gneiss, forming bold headlands. At Bradore are two lofty hills of gneiss, esti-

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mated by Bayfield to be twelve hundred feet high. Between Belles Amours and Anse-au-Sablon, on the northern side of the Strait of Belle Isle, occur the lower Silurian or Taconic rocks, which have been already fully described in the "Geology of Canada," published by the Canadian Geological Survey. In coasting within a mile or two of this interesting region we see the red sandstones running out as a low point of land resting on the lofty, precipitous Laurentian rocks. Between Bradore Bay and Anse-au-Loup these sandstones and grits rise up to a height of five to six hundred feet, forming the coast-line; and looking up through the bays and harbors we can see the low conical hills of Laurentian gneiss in the interior. At the eastern termination of this formation the Laurentian rocks rise into high, rugged, and broken syenitic hummocks, in marked contrast with the regular terraces and smooth slopes of the fossiliferous sandstones and limestones. Approaching Henley Harbor, there is a visible change in the scenic features of the coast; the hills grow more regular in outline, and slope gradually to the water, giving us the peculiar physiognomy of the Laurentian gneiss.

Upon entering Henley Harbor the dark gneiss is seen resting upon syenite, and at the point of contact interpenetrated by irregular intrusive masses of the latter rock. On Henley Island, where these rocks crop out under the trap capping this island, there appears a true syenitic gneiss, very hard, distinctly stratified, and of the usual flesh color of the syenite.

At this point I broke off some pieces of nearly unstratified syenite which showed very distinctly the sedimentary origin of the rock, for the cavities were often

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partly rounded and contained rolled quartz pebbles, one being ovate and nearly two inches long. This syenitic gneiss was evidently an altered conglomerate.

The syenite is the same as occurs on the coast of the St. Lawrence River, and while of the same color as that of the Maine and Nahant syenite, differs in its greater hardness and in the absence of black hornblende. It is composed of a flesh-red orthoclase or potash feldspar and a smoky and glassy quartz with minute particles of hornblende disseminated sparsely through the mass. It is exceedingly tough and durable, as evidenced by the lofty capes and islands standing far up above the gneiss rocks spreading around the base of the overflows.

At the northern end of the island the syenitic gneiss dips under the trap in a southeasterly direction at an angle of 50°. On an island a few rods farther to the north the gneiss assumes its usual character, being banded with light and dark strata, and has the general N. N. E. strike and dip indicated above.

At Square Island, which lies at the mouth of a deep bay just north of Cape St. Michael occurs in large, conical hills what I judge to be the great anorthosite formation of Logan and Hunt, composed of large, crystalline masses of labradorite, with a little vitreous quartz, and coarse, crystalline masses of hornblende. The labradorite is of a smoky color, very lustrous, translucent and opalescent, with cleavage surfaces often two inches in diameter, and on some of the faces presents a greenish reflection. This is but a slight approach to the rich blue reflections of the precious labradorite which I have seen only at Hopedale, where we obtained specimens brought from the interior by the Eskimos which

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compared favorably with specimens from the Ural Mountains.

As the rock weathers, the greenish hornblende crystals project in masses sometimes two inches in diameter. This rock easily weathers, and large masses are detached by frosts and readily crumble to pieces. The gneiss rests on the south side of the hill. From the top of the hills here can be seen huge gneiss mountains at least two thousand feet high, rising in vast swells at a distance of fifteen to twenty miles in the interior, while the bay is filled with innumerable *skiers* and islets of gneiss.

At Cape Webuc or Harrison the gneiss again appears upon the coast as a lofty headland faced with steep precipices of syenite. From off this cape are seen in the interior lofty mountains, of which the central and highest peak is called Mount Misery, which in this clear climate can be plainly seen in pleasant weather by fishermen at a distance of seventy-five miles in an air line. At Strawberry Harbor on the south side of Thomas Bay are lofty syenite hills. This point is fifty-five miles north of Cape Webuc. It is a small, deep hole in the coast, like a "purgatory," and an amphitheatre of rock rises around it in huge steps, affording a striking illustration of the power of the frost and waves on this exposed coast. The rock is a hard, tough, flesh-colored syenite, with deep vertical and horizontal fissures resulting from the decomposition of thin trap dykes, thus causing huge blocks of syenite to be detached and fall down. In sailing twenty-five miles up this bay, the gneiss rises on each side from the ocean into hills eight hundred to one thousand feet in height. About Hopedale, which is in latitude 55° 30′, the rocks are gneiss. Behind the Mis-

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sion House the strata are much disturbed locally; at one locality the gneiss with veins of quartz and syenite trends northwesterly and dips 60° west. Trap dykes, prismatic in places, cross the island in a northeasterly direction.

Northward of Hopedale the "Aulezavic gneiss" of Lieber forms the coast range of mountains, which, according to Lieut. Curtis (Trans. Geol. Soc., London, vol. ii. 1773), rise to a height of 2,733 feet at Mount Thoresby, on an island south of Kiglapeit. This observer states that Kiglapeit is evidently higher than, but inferior to, Kaumajet, which "has been seen thirty leagues from land," and is lower than Nachvak, which must be three thousand feet high.

At Aulezavik Island near Cape Chidley, according to Mr. Lieber, "syenitic gneiss is the true rock of the region, the normal one, although so many modifications occur that entirely new rocks are produced, having no direct connection with the basic syenitic gneiss. In consequence of this we have beds in which quartz alone occurs, or beds entirely occupied by the red feldspar of the region, as is seen with very beautiful distinctness in some of the dangerous Pikkintit Islands. Again, some beds are composed of white quartz and tourmaline as in Norway, others contain scarcely anything but black hornblende, or tourmaline and garnets. Some are composed of green hornblende, approximating to actinolite. From this there seems to be a passage into a coarse diorite rather porphyroid in its character, but occurring in regular intercalated beds, not in dykes, and evincing no sign of an eruptive origin. Again, some beds are composed of quartz and garnet, while others are studded

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with a beautiful golden-colored mica. A rock which appears identical with aphanite, although not at all igneous, I also found, yet, with all this apparent variety, the transitions are too gradual to permit the differences to leave any effect on the landscape."

For some notes on the geology of Hamilton Inlet we are indebted to Mr. Davies: "In some places mica slate was found—it is said that the Mealy Mountains are composed of this rock. I had no opportunity of verifying this fact, as I did not visit them. Granite was only seen in one place, viz., on Lake Keith, an expansion of the Grand River, about one hundred and thirty miles from its mouth. Specimens of chlorite schist were also procured on this lake, as was also a specimen of sandstone, with disseminated grains of iron pyrites. At some distance below the lake, primary marble, of a beautiful whiteness, was seen cropping out at the edge of the water; it was found in contact with a quartz rock passing into mica slate, having crystals of common garnet imbedded in it; this was the only place where limestone of any sort was seen.

"The shores of the bay where they are not of rock are generally composed of rolled fragments of syenite, mica-slate, quartz, hornblende, sometimes in large masses, feldspar, etc. Magnetic iron in the form of sand was also met with in some of the small coves."

Laurentian Trap-rocks.—At Henley Harbor is a system of trap-rocks which have been upheaved in a N. N. E. and S. S. W. direction, in a course much more northerly than the direction which the Straits of Belle Isle assume. These rocks consist of three masses of columnar basalt, capping the syenitic gneiss. It is a hard,

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fine, compact dolerite, breaking with a conchoidal fracture and metallic ring, and contains much iron. The mass is two hundred and fifty-five feet high on Henley and Castle Islands, and consists of two layers of vertical columns. West of these basaltic rocks, on the opposite side of the harbor, is a large trap overflow forming a hill over three hundred feet high, and apparently of the same age. It should be remarked that the two layers of basalt representing successive overflows incline at a very slight angle towards the S. W. The third mass of basalt is seen rising out of the ocean a few miles northerly, nearly in a line with the basalt of Henley Harbor.

Dykes of this age were likewise seen at Strawberry Harbor, Cape Webuc, and at Hopedale, intersecting the Laurentian gneiss and syenite. Their age is plainly anterior to the deposition of the undisturbed Cambrian, "primordial" strata at Anse-au-Loup, and on the Newfoundland coast opposite.

Domino Gneiss.—A system of light-colored gneiss and trap rocks which lie in a depression of the Laurentian rocks, about one hundred and twenty-five miles long and probably twenty-five miles broad, stretching along the coast between Domino Harbor and Cape Webuc, agrees with the "Domino Gneiss" of Mr. Lieber.

At Domino Harbor in lat. 53° 30″, these rocks attain their greatest development, occurring as a slightly schistose, light-colored gneiss, the base of which is a white granular vitreous quartz, with speckles of black hornblende, with a few particles of a lilac-colored mica. There are also minute rude crystals of yellow garnet, or cinnamon stone, disseminated through the mass. No feldspar was detected in this rock. In some places the

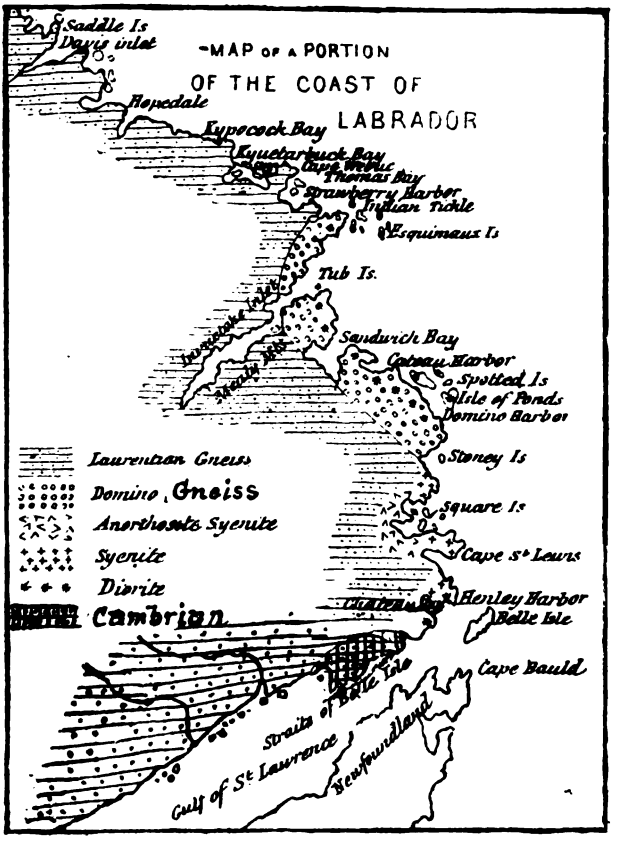
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rock was exceedingly fine, in others it assumed almost a conglomeritic aspect, from the presence of small masses of quartz. The quartz is often colored green. This rock weathers easily, leaving masses of quartz projecting on the surface; it is comparatively soft, and has been greatly denuded. It thus forms at this locality a broad, low, flat plain about ten miles broad and fifteen to twenty miles long, through which rise bosses of trap. Its surface is but a few feet above the level of the sea, and to one just coming from the high coast to the southward this broad, naked flat, almost wholly destitute of vegetation, with no valleys to shelter even a growth of spruce trees, and but slightly furrowed by glacial action, with patches of white rock glistening in the sun from between the dull green morasses and ponds that are everywhere scattered over its surface,—presents a strange and foreign feature of the coast scenery, startling from its very tameness. When in contact with the trap hills the rock is much harder, rising into higher elevations.

Nowhere was I able to see the juncture of this rock with the Lower Laurentian gneiss, which rises from the edge of this formation into high hills and mountains. So smooth had this plain been levelled and worn by glacial and aqueous agents, that it was difficult to observe the dip and strike of the beds, which, when undisturbed by eruptive rocks, I am inclined to believe, dip easterly at a slight angle. At Dumplin Harbor, which is a bight in an island lying just S. E. of Huntington Island, the gneiss, when lying next to trap, dips at an angle of 35° S. E., the strike of the beds being northeasterly. At Tub Harbor these rocks come in contact with the Laurentian syenite. Between the lighter-colored gneiss

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were beds of a dark fine-grained hornblendic quartzose gneiss, capped by the syenite. At Indian Harbor, about thirty miles north of Tub Harbor, and on the opposite side of Hamilton Inlet, these same rocks appear. These



rocks occur also at Sloop Harbor, rising two hundred feet high, and are capped by syenite, which is very pale in color, with particles of black hornblende. Here, as at Tub Harbor, the strata at the point of contact with

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the syenite become a dark gneiss. The Esquimaux Islands, which lie off this coast, are composed of this light-colored gneiss.

Invariably accompanying these rocks is a doleritic trap of a peculiar mineralogical character, occurring in overflows of a peculiar physiognomy, and upheaved in a direction at nearly right angles to that of the Laurentian dykes, thus following the general northwesterly trend of the Atlantic coast of the peninsula.

This rock differs from the hard fine-grained trap at Henley Harbor in being coarsely porphyritic. It is composed of large crystalline masses of hypersthene and labradorite, this last being of a dark smoky color, and precisely such as described as occurring on Square Island. It seems to follow that this porphyritic trap is the result of the refusion of the anorthosite rock, which must consequently underlie this Domino quartzite. This is an argument for the unconformable bedding of this gneiss upon the Lower Laurentian gneiss, while this trap-rock is evidently of the age of the Domino gneiss, which it has somewhat disturbed. The Isle of Ponds is largely composed of these trap hills. Huntington Island is a large mass of trap. Tub Island, as its name betokens, is a peculiar, truncated cone of trap, resembling an inverted tub. These trap overflows extend northward to Cape North, which is a lofty headland of trap capping the gneiss, and thus adding very materially to the elevation of this as of all the other numerous gneiss promontories which run out from the main land. Occasionally an island is seen half black and half white, one side being composed of the dark trap-rock, and the other of the light-colored quartzite. Such is "Black and White," a

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very prominent island near "Indian Tickle," a harbor at the northern side of Hamilton Inlet. Here are some remarkable dykes which ascend the gneiss hills in huge irregular zigzag crests, often crossing each other at right angles.

Beyond this point the older Laurentian gneiss again appears, and forms the high bold shores extending to Hopedale, rising in the interior into lofty imposing mountains on whose tops lie patches of snow.

Among the erratic rocks at Domino Harbor were some which show that in the interior are beds of jasper and chert. There occurred several small bowlders of jasper and gneiss. The jasper was pale green, banded and striped by darker shades of green, while the irregularly alternating bands of syenitic gneiss appeared to be an altered quartzite, as it was found under a glass to be largely composed of a fine granular quartz-rock, with a little flesh-colored and white feldspar, and minute particles of hypersthene.

Several bowlders of chert occurred at Tub Island. This was a very tough, compact, silicious rock, lineated by fine veins of quartz. It weathers to a dull chalky white.

It is most probable that these rolled stones were borne down from the interior by glaciers, but the chert pebbles may have been borne on floating ice from Frobisher's Bay, as Mr. Hall notices such rocks as being abundant there. At Tub Island I was shown specimens of magnetic iron ore, which were brought from "Cartwright's Tickle," a few miles toward the main land. It occurred in veins half an inch wide.*

* For further information regarding the Laurentian rocks of Northern Labrador, see Dr. Bell's observations in Report of the Canadian Geological Survey for 1884 and '85.

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Quaternary Formation.—In studying the drift phenomena of Labrador as compared with those of the temperate zone, we shall at the outset find ourselves disappointed in our anticipations as to their relative development. In a region which has evidently been exposed to the most intense action of glaciers, prolonged over a period vastly longer than in Canada or New England, we have surviving this period of denudation and wasting away of the surface but few drift scratches remaining on any exposed surfaces below a height of five hundred feet above the sea, and superficial deposits which are reduced almost to a minimum as compared with those of the temperate zone.

In this absence of drift and more recent deposits, the Labrador plateau agrees exactly with all mountainous districts above the level of most deciduous trees. We are to look to the lowlands about their base for the débris and drift borne down by streams or glaciers from the mountain centres. The Labrador plateau has been greatly denuded. Its highest mountains have been truncated and their peaks sliced off by the denuding agent as if by a knife. The Domino gneiss has lost at least three hundred to four hundred feet of its comparatively soft strata, as evidenced by the lofty trap hills which now rise above the strata of altered sandstones. The trap is as firm and hard at the top of the overflows as at the base. The loose material resulting from this long.continued denudation is not now found in the interior or on the coast of Labrador, except in very small quantities. It was evidently conveyed southwards by icebergs and floe- or shore-ice, and forms the bottom of the St. Lawrence Gulf, and the banks and shoals southward. In

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most subarctic and all arctic lands the soil is but a few inches deep.

In all temperate regions the superficial deposits have been characterized by Prof. Desor * to be "a succession of rocky hills and drift plateaus or valleys, which can be traced to the highest elevation of the country, near the dividing ridge, each following plateau or valley being commonly at a higher level than the preceding." This state of things obtains in Labrador, but there is an immense disproportion between the rocky hills and the drift deposits. We find no sandy plains or level tracts of glacial drift, or marine clays, distributed at intervals from the coast to the interior. They take the form of occasional, isolated sand-banks and cliffs of clay, of slight extent, overhanging rivers, and which by their secluded and retired positions have escaped the general denudation by the Labrador current which must have passed over the lower levels of the peninsula subsequent to the glacial epoch. In travelling in the interior we find ourselves walking, when it is possible to walk or climb at all, over the rocky floor of this inhospitable region, smoothed in spots, though rarely striated by glaciers, but on the coast more generally mangled and torn by the action of shore-ice and frosts, which have here shown a vast power.

The Leda clays are mostly confined to the head of retired bays, or if in more exposed situations, lie between bold headlands. The vast sand barrens of Canada and New England spreading into broad plains, are here represented by precipitous masses of sand hanging upon the

* Foster and Whitney's *Report on the Geology of Lake Superior.*

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steep mountain slopes. The traveller stumbles upon them in ascending the swift impetuous streams.

The most abundant superficial deposits in Labrador are the ancient sea-beaches, which are found, according to Prof. H. Y. Hind, at all levels to a height of twelve hundred feet above the sea, at a distance in the interior of one hundred and twenty-five miles from the coast. They are evidently altered glacial moraines.

Glacial Epoch. Drift Striæ and Rounded Rocks.— The Labrador plateau has been, at least near the Atlantic, moulded by ice to a height at least of twenty-five hundred feet above the level of the sea. In Southern Labrador Dr. Bell states that the valleys and hills, "up to the height of sixteen hundred feet, at any rate, have been planed by glacial action." (Rep. for 1884, 37 D.D.) The gneiss mountains are moulded into large flat cones, often with a nipple-shaped summit; the syenites are either moulded into domes or into high conical sugar-loaves; the anorthosite syenite at Square Island occurs in high rude cones; and the trap overflows accompanying the Domino gneiss form rough irregular bosses. Only at one point, near the northern termination of the peninsula at Cape Chidley, have the mountains by their altitude escaped the rounding and remodelling action of glaciers. These scraggy peaks, covered with loose square blocks detached by frosts from their slopes, remind us of the summits of Mount Washington in New Hampshire and Mount Katahdin in Maine. In a sketch of the former mountains by Mr. Lieber, as given in the "Report of the Coast Survey," the transition from the remodelled low mountains of the coast to the "wild volcanic-looking mountains" of the interior height of land

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is very marked. Mount Bache, which was determined by the expedition to be two thousand one hundred and fifty feet high, was "one of the smallest mountains." The larger ones are inaccessible. Those who have been upon the summits of Mount Washington or Katahdin will recognize how well Mr. Lieber's description of the summit of Mount Bache agrees with the physiognomy of the New England alpine summits:

"A second cause of the irregularity of surface here is to be found in the tremendous power of the frost of a Labrador winter, the influence of the heavy covering of snow, and very probably also the former existence of glaciers, all of which we shall presently take occasion to discuss.

"The effects of frost are manifested in a singularly forcible manner. The entire surface, where it is not too steep to enable débris to collect, is covered with broken masses of rock, cubes of ten feet and less scattered in wildest profusion. Sometimes a patch of moss, the grass and heather of this country, fills up the crevices, but generally we may look down into them far and deep without ever detecting the base upon which the rocks rest, hurled aloft, as they appear, by the hands of Titans. In scaling, in company with Mr. Venable, the summit of Mount Bache, on an occasion intended mainly for taking its altitude barometrically, we enjoyed the finest opportunities for studying this phenomenon. The summit and sides of the mountain present few steep precipices. I speak comparatively only, and in reference exclusively to Northern Labrador. Yet, scattered helter-skelter over all, and piled up in endless number, the whole surface is covered with such loose rocks. The difficulties of locomotion

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may readily be conceived. In scarcely a single instance did we see the gneiss beds still *in situ*, and in only one or two exceptions some giant wedge seemed to have driven them asunder. Yet none of the blocks were rounded. Attrition of no kind had influenced them to any perceptible extent, neither had atmospheric influences altered the color, hardness, and composition of their exteriors; it was simply a wilderness of unchanged blocks of the gray gneiss.

"There was a puzzle. Whence came these broken rocks? There was no higher spot whence they might have fallen. The slight protrusion of the uptilted beds of gneiss *in situ*, to which I have referred, alone seems to have been permitted to remain for the purpose of instructing us. Clearly, that force which had riven its beds asunder, no other than the *frost*, had broken the rest from their foothold and prepared them for removal by another coming into play at a later season—the thawing down-gliding *snow*. Many of the blocks were probably but slightly removed from their original position, perhaps barely turned over or merely forced a little out of place. Yet the effect to the eye of the beholder would be as great as if they had been transported hundreds of miles.

"When we descended from the mountain we crossed over a broad patch of snow, deeply packed (twenty feet deep), which clearly taught us how the blocks were moved. In truth, this was a miniature glacier, and a regular moraine was piled up along its edges. It is impossible for us to form any estimate of the amount of snow which may fall per square foot in a winter, but from the fact that such quantities were still remaining

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late in July, and certainly they never altogether thaw away, we may reasonably infer that during its downward progress, either as snow or water, a tremendous force must be exerted, a force quite sufficient to account for the characteristic surface phenomenon just described."

Contrary to the statement of Sir John Richardson in his "Polar Regions," both the accounts of Parry and the earlier arctic voyagers, and especially C. F. Hall in his "Arctic Researches," prove that on the northern edge of the American continent, and as low down as lat. 62°, and upon land rising between one thousand and two thousand feet above the level of the sea, there are *mers de glace* of great extent, discharging glaciers into the sea which present ice-fronts one hundred feet high.

Parry, in his second voyage (p. 12), states that on the north side of Hudson's Strait, after passing by Resolution Island, there "is a smooth part of the land rather higher than that in its neighborhood, and for an extent of one or two miles completely covered with snow. The snow remains upon it, as Mr. Davidson informed us, the whole summer, as they find the land presenting the same appearance on their return through the Strait in the summer. This circumstance, which has obtained for it the name of 'Terra Nivea' upon the charts, I do not know how to account for, as the height of the land above the level of the sea cannot certainly exceed a thousand feet."

Mr. C. F. Hall, during his residence in Frobisher's Bay, had excellent opportunities of observing during all seasons of the year both ends of the Kingaite range of mountains on 'Meta Incognita' which support this *mer de glace*, which he named the Grinnell Glacier, and which

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on the coast annually discharges icebergs from its streams. He describes it as being two miles long, starting from a sea of ice which extended many miles N.W. and S.E., reaching across the peninsula of Meta Incognita, nearly to the strait which divides Frobisher's Bay from Hudson's Strait. Mr. Hall states that "from the information I had previously gained, and the data furnished me by my Innuit companion, I estimated the Grinnell Glacier to be fully one hundred miles long. At various points on the north side of Frobisher's Bay between Bear Sound and the Countess of Warwick's Sound, I made observations by sextant by which I determined that over fifty miles of the glacier was in view from, and southeast of, the President's Seat. A few miles above that point the glacier recedes from the coast and is lost to view by the Everett chain of mountains; and as Sharkey [an Esquimau] said, the *ou-u-e-too* (ice that never melts), extends on *wes-se-too-ad-loo* (far, very far off). He added that there were places along the coast below what I called the President's Seat, where this great glacier discharges itself into the sea, some of it in large icebergs.

"From the sea of ice down to the point where the abutting glacier was quite uniform in its rounding up, it presented the appearance, though in a frozen state, of a mighty rushing torrent. The height of the discharging face of the glacier was one hundred feet above the sea."

Given, as stated below, the rise of the Labrador peninsula only five hundred feet above its present level, and we must have had during the glacial period most extensive glaciers fed by broad seas of ice resting on the table-lands, reaching above the line of perpetual snow; as only one hundred and twenty miles northward of Cape Chidley

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we find the snow-line reaching as far down as one thousand feet, or thereabouts, above the sea-level. We are inclined to doubt the accuracy of Parry's estimate of the height of these table-lands, as the height of Mount Bache is over two thousand feet, and it just reaches the lowest limit of the snow-line, which in Greenland is two thousand feet above the sea.

Owing to the extensive weathering of the rock, glacial grooves and scratches occur very rarely.* I doubt not they will be found abundantly after ascending five hundred to eight hundred feet from the sea-level, for below this point the action of the waves and shore-ice has obliterated both striæ and loose drift. We have good evidence that an enormous glacier once filled the great fiord, Hamilton Inlet, which at its mouth is forty miles broad. Peculiar *lunoid furrows* were observed on the northern and southern shores about forty miles apart, which would seem to justify the conclusion, that the glacier was of that breadth where it descended into the sea. The best examples of these lunoid furrows oc-

* J. F. Campbell, who visited this coast in 1864, states in his work entitled "Frost and Fire," that at Indian Island, lat. 53° 30' "the striæ pointed into Davis's Strait at a height of four hundred feet above the sea; at Red Bay, in the Strait of Belle Isle, they aimed N. 45° E. at the sea-level."

At Newfoundland, about St. John's, "the striæ which were found were near the coast, and seem to indicate large land-glaciers moving seawards. At St. John's the marks run over the Signal Hill, five hundred and forty feet high, from W. and N. 85° W. eastwards; at Harbor Grace, from S. 75° W. down the bay northeastwards; at the head of Conception Bay they fill a large hollow, overrun hills, and point from S. 15° W. northwards. Vast terraces of drift stretch along the base of rounded hills at the head of Conception Bay, at Harbor Grace, and at Old Purlican, near the end of the bay, sixty miles off. At the head of the bay most of this drift seems to have come from the hills. Opposite to granite hills are numerous blocks of granite; opposite to sandstone and slate hills, sandstone and slate bowlders abound."—"Frost and Fire," ii. 1865, p. 240.

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curred at Indian Harbor on the northern shore of Hamilton Inlet, near the fishing establishment of Mr. Norman. This harbor is a narrow "tickle" or passage, where the Domino quartzites, very smoothly worn and polished, are capped by trap overflows, and run under the water to the depth of thirty feet, forming a polished and smooth bottom to the harbor. The marks occur about twenty-five feet above the water's edge, and below the line of lichens which are kept at a distance by the sea spray.

These crescent-shaped depressions, which run transversely to the course of the bay, were from five to fourteen inches broad by three to nine inches long, and about an inch deep vertically in the rock. Their inner or concave edge pointed southwest, the bay running in a general S.W. and N.E. direction. They were scattered



GLACIAL LUNOID FURROWS AT INDIAN TICKLE, LABRADOR.

irregularly over a surface twenty feet square. When several followed in a line, two large ones were often succeeded by a couple one quarter as large, or *vice versa*. Also at Tub Harbor, on the southern coast of this bay, similar markings, but less distinct, occurred about the same distance above the sea, and on a similar polished quartzite. These agree precisely with the "lunoid furrows" of Mr. DeLaski, as observed by him in great abundance on Isle-au-Haut, in Penobscot Bay, speci-

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mens of which he has deposited in the Museum of the Portland Society of Natural History.

These were the only glacial markings I observed. It should be noted that Mr. Jukes, in his "Geology of Newfoundland," states that he never observed any glacial striæ during his explorations on that island. They were observed in abundance by Professor Hind about fifty miles from the mouth of the river Moisie, where occurred "gneiss terraces five in number, the highest being about one thousand feet above the sea, and backed by a stunted birch- and spruce-clad mountain some eight hundred feet higher still. The sloping sides of these abrupt steps are rounded, polished, and furrowed by glacial action. Cuts half an inch deep and an inch or more broad go down slope and over level continuously. Rounded and water-worn bowlders are perched here and there on the edge of the uppermost terrace. These strange memorials of the drift begin to be more common" (p. 133).

Fine examples of rounded and embossed rocks occurred at a bay situated a few miles to the westward of Little Mecatina Island. Here the numerous islets of syenites assume a low dome-like shape, whose shores descend to the water's edge by a gentle slope, and are so smooth and polished that one can with difficulty descend them when wet without slipping.

On the southern coast the eminences all present their longer slopes to the northward, and their lee sides descend seaward and southward in sudden falls and slopes. On the contrary, on the eastern and Atlantic shores the *stoss* or struck sides look westward, and the lee side is on the eastern side of the hills, thus showing that the

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denuding and abrading agent moved downwards from the top of the water-shed—that is, always nearly parallel to the coast.

The adjoining illustration brings out clearly some of the characteristic features of the scenery of the coast of Labrador. In the foreground the rocky shore of the Horsechops, as the deep fiord is called, which is situated far up on the eastern coast of Labrador, has been ground down, smoothed, and polished by the great mass of land-ice which formerly filled Hamilton Bay and moved slowly down from the table-land in the interior, and whose ice-front must have presented to the sea a wall—perhaps five hundred to one thousand feet high.

Across the fiord on the shores of the bay, which rise abruptly in great rocky terraces—also a characteristic feature of Labrador and arctic landscapes,—may be seen scattered snow-banks, which linger on these shores as late as August, while those in the more shaded, protected places may live on until the early snows in September give them a renewal of life, so that their existence may become perennial.

About Cape Chidley the hills and rocks are shown by Mr. Lieber's drawings to have been rounded and moulded by ice to a height corresponding to that of Mount Bache, as noticed above.

Dr. R. Bell shows that the basin of Hudson's Bay may have formed a glacial reservoir receiving streams of ice from the east, north and northwest, and south and southwest. The direction of the glaciation on both sides of Hudson's Strait was eastward. "That an extensive glacier passed down the strait may be inferred from the smoothed and striated character of the rocks of the lower

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GLACIAL EROSION IN LABRADOR, NEAR THE HORSECHOPS. A LABRADOR "TILT" ON THE LEFT). 302

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levels, the outline of the glaciated surfaces pointing to an eastward movement, the composition of the drift, and also from the fact that the long depression of Fox's Channel and the Strait runs from the northwestward towards the southeast, and that this great channel or submerged valley deepens as it goes, terminating in the Atlantic Ocean. Glaciers are said to exist on the shores of Fox's Channel, and they may send down the flat-topped icebergs which float eastward through the lower part of Hudson's Strait into the Atlantic. During the drift period the glacier of the bed of Hudson's Strait was probably joined by a contribution from the ice which appears to have occupied the site of Hudson's Bay, and by another, also from the southward, coming down the valley of the Koksok River, and its continuation in the bottom of Ungava Bay. The united glacier still moved eastward round Cape Chudleigh into the Atlantic."

Distribution of Bowlders.—The whole surface of the country is strewn thickly with bowlders. After ascending five or six hundred feet above the level of the sea, and penetrating into the interior, their presence is especially marked. Near the shore they are rarely seen, being covered by vegetation. We must look for them about the edges of ponds and along the banks of the rivers, and especially in raised beaches. I am also inclined to think that their abundance near the coast is greatly lessened by their having been carried off by shore-ice into the sea, and there rearranged into submarine beaches.

No loose, single bowlders scattered over the surface of the country were seen on the coast from Mecatina to Square Island. They only occurred as stated above, along the courses of rivers, by ponds, and rearranged

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into beaches. But we first saw them on a hill, estimated roughly to be one thousand feet high, a few miles north of Cape St. Michael, at Square Island, where they lend a new feature to the landscape. At this level they were strewn sparsely upon the tops of the surrounding hills. One was about fifteen by forty feet in size. A large proportion were well rounded, while others were angular. The greater proportion were of syenite, a few small ones were of greenstone.

Northward of this locality I did not have an opportunity of ascending the mountains above the level of the ancient coast-line.

Professor Hind likewise found very few bowlders at a distance from the bed of the Moisie, for a distance of fifty miles from its mouth. But on ascending the watershed, and penetrating farther inland, they everywhere grew more numerous. A few miles beyond "Burnt Portage" on this river, "huge blocks of gneiss, twenty feet in diameter, lay in the channel or on the rocks which here and there pierced the sandy tract through which the river flowed; while on the summits of mountains and along the crests of hill ranges they seemed as if they had been dropped like hail. It was not difficult to see that many of these rock fragments were of local origin, but others had travelled far. From an eminence I could discover that they were piled to a great height between hills three and four hundred feet high, and from the comparatively sharp edges of many, the parent rock could not have been far distant." *

Also at Caribou Lake, an expansion of the same river,

* The Labrador Peninsula, p. 227. Also, *Quart. Journ. Geol. Soc.*, Jan. 20, 1864, p. 122, On Supposed Glacial Drift in the Labrador Peninsula, etc.

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he states, "the long line of enormous erratics skirting the river looked like druid's monumental stones; for in many instances they were disposed in such a manner as would almost lead one to suppose they had been placed there by artificial means" (p. 229).

Of this same expedition Mr. Cayley has published an account in the "Quebec Transactions," where we have the statement of this observer that bowlders are very thickly strewn over the surface and on the summits of mountains 2,214 feet high, and situated one hundred and ten miles from the coast, being near the head-waters of the Moisie. "Immense numbers of bowlders had for the last few miles strewn the sides of the mountains, in some cases almost seeming to make up the very mountains themselves; there being this difference, that whereas the rock itself *in situ* is granitic, the bowlders in every case are of gneiss." *

Nowhere did I see on the coast of Labrador any deposits of the original glacial clay, or "unmodified drift." Upon the sea-shore it has been remodelled into a stratified clay, and the bowlders it once contained now form terraced beaches. Professor Hind, however, notices the occurrence of "drift clay, capped by sand," in precipitous banks rising seventy feet above the level of the Moisie River, twenty miles from its mouth.

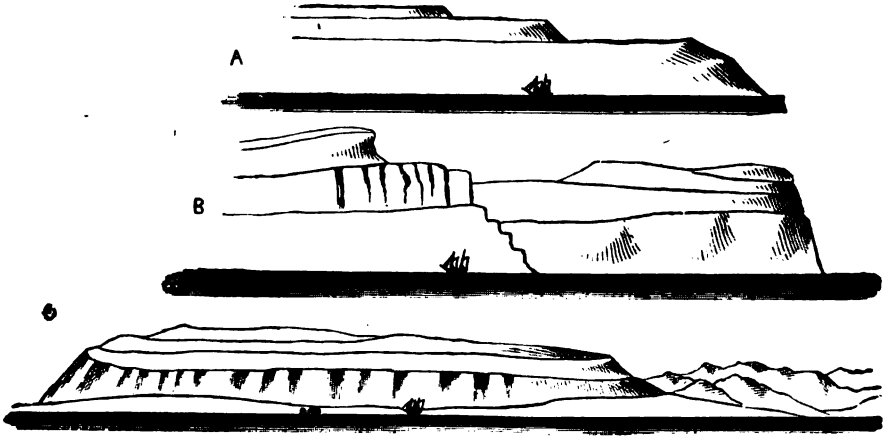
Before giving an account of the marine clays and their fossils, which should naturally come in at this place, I would draw attention to the numerous raised beaches that line this coast.

Raised Beaches.—Some of the finest examples of raised beaches and rock-shelves representing ancient coast-

* Up the River Moisie, *loc. cit.*, N. S., vol. i. p. 88.

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lines, about four hundred feet above the present coast-line, are seen in the lowest Silurian rocks on both sides of the Strait of Belle Isle. The following notes and sketches were made while coasting along the northern shore, which rises in high sandstone and gritty bluffs, contrasting in their regular water-worn outlines most strongly with the peculiar swelling curves of the Laurentian gneiss which rise near Bradore—according to Bay-



TERRACES AT ANSE-AU-LOUP, (*A*) (*B*) AND (*C*) LOOKING EASTWARD AT THE NORTHEAST END OF THE CAMBRIAN FORMATION.

field's measurements, one thousand two hundred feet above the sea—or the jagged, rough, and hummocky outlines of the rude syenitic hills, which rise four hundred feet above the sea. At Anse-au-Loup, as seen from one half to one mile from the shore, the land rises on the west side of the bay in three very regular terraces (*A*), the lower of which is covered with débris. On the east side the land is much more irregular, descending in buttressed steeps like the Palisades on the Hudson, though far exceeding them in height. On the east point

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are five terraces on the N. W. side with heavy buttresses, and beyond four terraces come in sight (*B*). The strata here are nearly horizontal, dipping under the Strait at a very slight angle. At the eastward termination of the formation are again seen five very regular terraces (*C*) running out in a long low point, beyond which rise the syenite hills. At Blanc Sablon five terraces are very distinctly marked, the second of which is the highest; and there is a beach of huge bowlders very regularly packed by the action of the waves, as observed by Admiral Bayfield.

In Château Bay and Henley Harbor are some fine examples of ancient sea-margins. They occur in recesses in the shore which have been sheltered from the denuding agency of the waves and strong arctic currents, which have swept around this bend in the coast with great power. The most plainly marked example forms the eastern shore of Henley Harbor, being the western shore of Henley Island. This beach, which is one hundred and eighty feet high above the water-level, is composed of three well-marked terraces, which become steeper as we go from the bottom to the top. The upper terrace begins at the base of the basaltic columns capping this island, and is covered at its upper edge with the débris from this mass of trap. The two lower terraces at the northern end of the island present a delta-like expansion facing the northwest. On these terraces, which are destitute of the usual covering of moss and Empetrum, can be most distinctly seen the windrows of pebbles and gravel thrown up by the retreating waves. A continuation of this beach is seen on Castle Island just south. (See p. 134.)

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On the eastern side of the same island is a beach of the same height, but much steeper, as it directly faces the ocean, and more irregular than the one just described, as its surface is broken by jagged masses of syenitic rock which protrude through it, and by large masses of trap which have fallen from the cliffs above.

North of Henley Island is a broad flat beach consisting of two low terraces, on the uppermost of which, and commanding the harbor, are the ruins of an old fort built during the last century. Also on the mainland near the head of the bay are situated in bights in the shore three low beaches, each composed of two terraces, overgrown with vegetation. They are all apparently of the same height, and correspond in height with that of the second beach or terrace on Henley Island. On the east side of Pitt's Arm is another similar beach, and still another at the head of the bay on the west side of the stream emptying into this bay. Upon this latter beach are large bowlders, often two feet in diameter. Across the bay from Henley Island is a lofty steep beach sloping towards the east, and of the same height.

It is an important fact that the present contour of the coast, from the sea-level to a height of about five hundred feet, also extends to at least fifty fathoms, or three hundred feet below the surface of the water. Such we found to be the fact in dredging for a distance of nearly six hundred miles along the coast. The jagged nature of the rocky terraces at Strawberry Harbor, so interesting a feature in the coast scenery, extends at least to a depth of two hundred and forty feet, a few rods from the shore, as in anchoring with the kedge anchor it would drop on to a rocky shelf, and then drag and fall twenty

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fathoms lower on to another syenitic shelf; such a succession of rocky terraces we have no doubt extended much farther below the point sounded by our ship's lead.

Again, dredging was carried on off Henley Harbor on a pebbly bottom three hundred feet below the surface which formed the continuation of the same beaches which rose some two hundred feet above the sea-level. It follows from this that as both the jagged rocks and submerged beach must have formerly formed a coast-line, the land once stood at least three hundred feet higher than at present, and it is more than probable, much higher. Such an elevation would have produced the most important modifications of climate, lowering it greatly, bringing the snow line farther down towards the coast, and must have led to a great accumulation of the snow and land-ice.

At the settlement in Château Bay is a remarkably steep beach, which ascends half-way up the side of the hill, which is about five hundred feet high. It is composed of large bowlders very closely packed in layers, without any gravel to fill up the interstices, and slopes to the level of the water at an angle of at least 40°, being the steepest beach I saw on the coast. It consisted of two terraces, the lowest almost precipitous in its descent. This beach, when below the level of the sea, was evidently exposed to the action of the powerful Labrador current which piled these huge water-worn rocks into a compact mass which served to resist the waves, while the coarse gravel and sand were borne rapidly away farther out to sea on to lower levels. It is a general rule that all beaches on this coast with a northerly and easterly

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exposure to the open sea, are much steeper, and composed of much coarser materials, than those in more sheltered situations.

At Domino Harbor are beaches more than one hundred feet high, and in sailing up the sound which lies between the mainland and the numerous islands that line this coast, twelve beaches were seen rising from forty to one hundred and fifty feet above the level of the sea, and composed of two or three terraces.

In Sloop Harbor, twenty-five miles south of Cape Harrison, is a noble shingly beach nearly two hundred feet high on the south side of the harbor, consequently facing the north.

Thomas Bay, which lies about thirty miles south of Hopedale, afforded, along both of its shores for thirty miles from the sea, fine examples of raised beaches, composed for the most part of three terraces. High beaches also occurred at Hopedale. The mission house and buildings belonging to this Moravian settlement also rest upon raised gravelly beaches, which afford soil deep enough for gardens and cemeteries.

It is to be regretted that from want of time and proper instruments we were unable to measure the heights of these beaches and their respective terraces. Those given are simply approximative, with the exception of the one noticed as occurring upon Henley Island. The mass of basalt was rudely measured by Lieut. Baddeley, and estimated to be two hundred and fifty-five feet high. The terraces rise to the base of the pillars, which he estimated to be one hundred and eighty feet above the sea.

I believe it will ultimately be found that all these beaches rise above the present level of the sea at uniform

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heights, and will be found generally to agree in this respect with similar beaches in the St. Lawrence River and the coast of the British colonies and New England, after making due allowances for local oscillations of the land. At Château Bay it could easily be seen that all the terraces composing the different beaches were of the same height; and, so far as memory would show, in the absence of actual measurement, all those beaches observed farther northward presented terraces which very generally corresponded in height with those of Château Bay.

I am informed by Captain Ichabod Handy of New Bedford, Mass., who has spent several years in Hudson's Bay engaged in the whale fishery, and is a close observer, having coasted in a whale-boat the whole shore from Nain to Resolution Island in lat. 62°, that there are several very high raised beaches near Hebron, and also near Nain, one of which he roughly estimated to be three hundred feet high. He observed that the beaches north of Nain increased in height. There were also beaches on Button Island. He noticed one on Resolution Island, about two hundred feet high, which was composed of three terraces. On the Lower or East Savage Island he described to me a plain of soft clay elevated fifty feet above the sea, into which he "sank knee-deep," and perceived in it numerous "clams and mussels," and also the skeleton of a whale, the "boar-head" whale (*Balaena boöps*), stranded upon the surface. This ancient sea-bottom was flanked by a raised beach from thirty to forty feet in height.

At Sir Thomas Roe's Welcome he describes the beaches as being higher than any observed southwards,

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and he also noticed clay-banks, containing shells, raised above the present level of the sea.

Prof. Hind has noticed some remarkable beaches far in the interior of the southern part of the peninsula, and at a great height above the present level of the sea. Though this author does not refer to their rearrangement by the currents and waves of the sea, his description of the immense deposits of rounded and water-worn bowlders agrees precisely with similar raised beaches both upon, and a mile back from, the coast, observed by myself, where they are covered by moss and Empetrum, or stunted spruces. At "Burnt Portage," upon the river Moisie, one hundred miles from its mouth, and 1,857 feet above the level of the sea, this author describes a "hill of bowlders or erratics, all water-worn and smooth, without moss or lichen upon them, and piled two or three deep, and, for aught you know, twenty deep. . . . The well-worn masses of all sizes, from one foot to twenty feet in diameter, and from one ton to ten thousand tons in weight, are washed clean. . . . I could without difficulty see three tiers of these 'travelled rocks,' and in the crevices the charred roots of trees which had grown in the mosses and lichens which formerly clothed them."

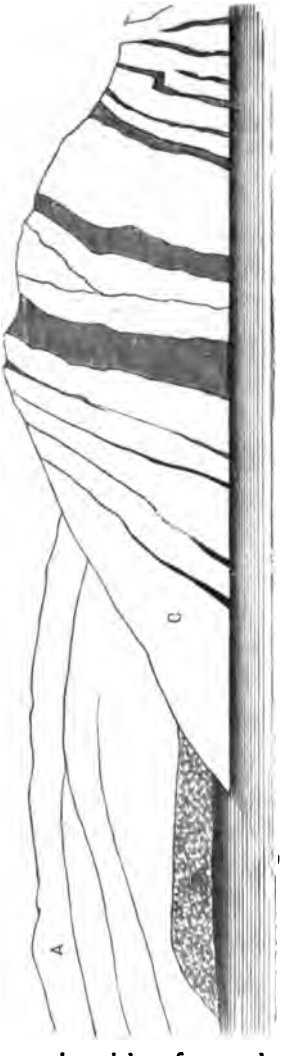
Another feature of great interest in this connection are the rocky terraces or steps which have been hewn out of the solid rocks along the coast for a height of five hundred feet above the present level of the sea, and mark the oscillations of the old coast-line; and as there occur in the interior of the country one thousand feet above the present coast-line similar lines of erosion, they present the best evidence we have, to determine how far

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above its present level the glacial sea stood. These rock terraces could only have been formed so fully as seen here during a vast period, and the ice-foot of Dr. Kane, to which their formation is probably due, must have remained on the shore during the entire year. Fine examples of similar terraces are described and figured in Kane's "Explorations," vol. ii. p. 81. At various points along the coast the joint action of frost, the waves, and floating ice can even now be seen building up these steps in the slopes of trap and syenitic rocks, by taking advantage of the jointure and cleavage-planes which cross at nearly right angles. At Strawberry Harbor the syenitic rocks have broken off into huge cubical blocks of many tons' weight. The rock abounds in cracks and fissures, into which the ice has entered wedge-like, and burst them asunder, while the fragments have been borne away by shore-ice. Thus for a height of five hundred feet the shore consists of a series of steps ten to thirty feet high, forming broad shelves on which the sea-birds build, and where a little vegetation lodges. Where the shore consists of trap-rocks, as at Domino Harbor and Tub Island, the steps are much smaller and more numerous. At Domino there are regular steps in the quartzites, which lend a very peculiar feature to the shores of the harbor, as at a little distance the rocky slopes descending by hundreds of steps to the water, appear like a lofty beach of bowlders. At Sloop Harbor these rocky steps are of vast extent, their tops shelving inland, and in profile the rocky promontory presents a strange serrated outline when viewed from the sea. The lofty sugar-loaf syenitic island a few miles south of Hopedale, noticed previously,

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and which is seven hundred feet high, has its surface divided into four terraces of rock, which reach two thirds

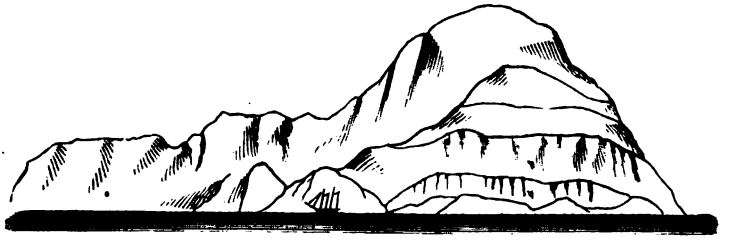


VIEW JUST NORTH OF SLOOP HARBOR, KYUEARTARBUCK BAY; (*A*) GNEISS TERRACES, 500 TO 800 FEET HIGH; (*B*) RAISED BEACH AT THE HEAD OF A SMALL BAY; (*C*) A HEADLAND OF DOMINO QUARTZITE (?) INTERSECTED BY TRAP DYKES.

of the distance up its sides from the water, thus affording a means of estimating the different heights at which the

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land paused in its oscillations upwards.* We must again refer to Mr. Hind's work for an account of similar rocky terraces in the interior of the peninsula. Near the "Lake where the land lies," he describes the gneiss hills



ROCK TERRACES ON A CONICAL PROMONTORY NEAR HOPEDALE, LABRADOR.

as rising in "gigantic terraces." He likewise speaks of "gneiss terraces five in number, the highest being about one thousand feet above the sea," and he states that the sloping sides of these abrupt steps are rounded, polished, and furrowed by glacial action.†

Mr. Cayley has described them also quite fully: "We now made the fifth portage [fifty miles from the mouth of the river, and 370 feet above the level of the sea], where we first met with some curious natural steps or terraces, which were continually repeated on our march. They were usually five or six in number, averaging three or four feet in height; the distances between each rather irregular, just affording room enough to take two or three paces, and their surfaces presenting the appearance of having been artificially constructed. They were of

* "Terraces or banks of gravel and ancient shingle beaches were observed on either side of the inlet [Nachvak Inlet] at various heights up to an estimated elevation of two thousand feet." Bell's "Observations," 1885, Rep. Geol. Surv. Canada for 1885, p. 7, DD.

† Hind's Labrador, p. 133.

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the common dark hornblendic gneiss, and ran in a general northeast and southwest direction." *

No glacial striæ upon these terraces were observed near the shore. It is evident that this process of terracing the crystalline rocks by frosts and shore-ice began during the glacial epoch. At present we must assume that the striæ found by Professor Hind upon these rocky steps far inland were graven by angular stones frozen into the bottoms of glaciers, for we find no such marks at present upon those now upon the coast, which shows how insufficient is the action of floating shore- or floe-ice, or grounded bergs even, in striating so regularly these hard crystalline rocks.

We saw a good example of rocks polished by the ice and waves at Gore Island Harbor, a point westward of Little Mecatina Island. On the faces of several cliffs forming perpendicular walls facing a narrow passage into which the waves rushed with great force in the calmest days, the sea-wall was smoothly polished and water-worn for ten feet above its shore-line, while above, the face of the cliff was roughened by the action of frost.

Upon this coast, which during the summer of 1864 was lined with a belt of floe-ice and bergs probably two hundred miles broad, and which extended from the Gulf of the St. Lawrence at Belles Amours to the arctic seas, this immense body of floating ice seemed *directly* to produce but little alteration in its physical features. If we were to ascribe the grooving and polishing of rocks to the action of floating ice-floes and bergs, how is it that the present shores far above (500 feet), and at

* Up the River Moisie, *loc. cit.*, p. 82.

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least 250 feet below the water-line, are often jagged and angular, though constantly stopping the course of masses of ice impelled four to six miles an hour by the joint action of tides, currents, and winds? No bowlders, or gravel, or mud were seen upon any of the bergs or masses of shore-ice. They had dropped all burdens of this nature nearer their points of detachment in the high arctic regions. The bergs all bore evidence of having been repeatedly overturned as they were borne along in the current. Thr floe-ice was hummocky, which is a strong proof of its having come from open straits in the polar regions, the masses looking as if having been frozen and refrozen, jammed together, and then piled atop of each other by currents and winds long before appearing upon this coast; while the bergs exhibited old water-lines presenting different angles to the present water-level. The only discoloration noticed was probably caused by seals resting upon and soiling the surface. One bowlder was noticed by a member of the party resting upon an iceberg off Cape Harrison in August.

This huge area of floating ice, embracing so many thousands of square miles, was of greater extent, and remained longer upon the coast in 1864 than for forty years previous. It was not only pressed upon the coast by the normal action of the Labrador and Greenland currents which, in consequence of the rotatory motion of the earth, tended to force the ice in a southwesterly direction, but the presence of the ice caused the constant passage of cooler currents of air from the sea over the ice upon the heated land, giving rise during the present season to a constant succession of northeasterly winds from March until early in August, which further served

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to crowd the ice into every harbor and recess upon the coast. It was the universal complaint of the inhabitants that the easterly winds were more prevalent, and the ice "held" later in the harbors this year than for many seasons previous. Thus the fisheries were nearly a failure, and vegetation greatly retarded in its development. But so far as polishing and striating the rocks, depositing drift material and thus modifying the contour of the surface of the present coast, this modern mass of bergs and floating ice effected comparatively little. Single icebergs, when small enough, entered the harbors, and there stranding, soon pounded to pieces upon the rocks, melted, and disappeared. From Cape Harrison in lat. 55° to Caribou Island was an interrupted line of bergs stranded in eighty to one hundred or more fathoms, often miles apart, while others passed to the seaward down by the eastern coast of Newfoundland, or through the Strait of Belle Isle.

The Labrador Banks.—Prof. H. Y. Hind* has pointed out the existence of shoals or fishing-banks off the Ailik Head and Kippokak Bay, composed of morainal matter brought down the fiords and pushed into the sea. That the fiords and bays were, however, excavated by the glaciers themselves we are much inclined to doubt, since these bays and fiords were natural valleys, which perhaps date back to Laurentian times, and which have been for many geological ages excavated by streams, though during the glacial epoch remodelled by the ice and subglacial streams. Referring to Kippokak Bay, the next

* The effects of the fishery clauses of the treaty of Washington on the fisheries and fishermen of British North America, 1877, Part II. pp. 68, 69, quoted in Goode's Fishery Industries of the United States, V. vol. i. 134–137, 1887.

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bay north of Ailik, he remarks: "But the glaciers of Labrador have probably left even more valuable records, in the form of moraines, of their early existence here than deep fiords or innumerable islands. These are the shoals and banks which lie some fifteen miles outside of the islands, and on which icebergs strand in long lines and in groups. I have styled them the Inner Range of Banks, to distinguish them from a supposed Outer Range in deeper water, where large icebergs sometimes take the ground. The inner banks, as far as they are known, are stated by fishermen to have from twenty to forty fathoms of water on them. Commander Maxwell's soundings between Cape Harrison and Gull Island, near Hopedale, and just outside of the island zone, rarely show depths greater than forty fathoms. In one instance only, in a distance of about one hundred and ten nautical miles, is a depth of fifty-nine fathoms recorded.

"*Absence of Islands on the Southern Labrador.*—The Admiralty chart portrays a very important confirmation of the Labrador coast-line, from Saint Lewis Sound to Spotted Island. The trend of the coast-line between the Battle Islands, south of Saint Lewis Sound, and Spotted Island, Domino Run, a distance of sixty-five miles, is due north, and, with very few exceptions, there are no islands off the coast throughout this distance, excluding the group close inshore between Spotted Island and Stony Island. As soon as the coast-line begins to turn northwesterly islands become numerous and continually increase in number as far as Cape Mugford, and even towards Cape Chudleigh. Between Cape Harrison and Cape Mugford, the island zone may be estimated

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as having a depth of twenty miles from the mouth of the fiord seawards. The cause of the general absence of islands south of Spotted Island and Stony Island can probably be traced to the never-ceasing action of northern ice driven on the coast-line, where it suddenly makes its southerly bend by the influence of the rotation of the earth upon the arctic current. This current sweeps past the Labrador coast with a speed of from 1½ to 2 knots an hour, and a westerly pressure, due to the earth's rotation, which may be estimated at about eleven inches. That is to say, the mean level of the sea on the coast of Labrador is supposed to be about eleven inches above the level it would assume if uninfluenced by the earth's rotation. As soon as the ice-ladened current reaches Spotted Island it is in part relieved from this pressure by the trend of the coast from southeast to due south; hence the current changes its course suddenly and onto the land. But the effect of this sudden change in the direction of the current near the shore is to throw the icebergs onto the coast from Spotted Island to Cape St. Lewis, where they may be seen stranded each year in great numbers. The islands which doubtless once existed here have been removed by constant abrasion, acting uninterruptedly for ages, and with the islands the moraines lying seawards. We may thus trace the cause of the vast difference between the distribution of stranded icebergs south of Spotted Island and northwest of it. In one case they are stranded near the coast-line, wearing it away and deepening the water near it, assisted by the undertow; in the other case they are stranded some fifteen miles from the island fringe, and continually adding to the banks the débris they may bring, in the form of mud

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streaks, from the glaciers which gave them birth in the far north and northeast. It is more than probable that this distribution of icebergs has a very important bearing upon the food and feeding of the cod, which justifies me in referring here with so much detail to the action of glacial ice.

"*The Inner Range of Banks.*—The foundation of the inner range of banks consists, very probably, as already stated, of glacial moraines. In their present state they may reasonably be assumed to be formed in great part of remodelled débris brought down by the same glaciers which excavated the deep fiords.

"The absence of deposits of sand in the form of modern beaches on every part of the Labrador coast visited this season, except one, was very marked. The exceptional area observed lies between Sandwich Bay and Hamilton Inlet, Cape Porcupine being the centre. It is protected from the northern swell of the ocean by the Indian Harbor Islands and promontory. Here large deposits of sand are seen, covering many square miles in area. The reason why sandy beaches are not in general found on this coast, notwithstanding that enormous quantities of rock are annually ground up by coast-ice and ice-pans driven on the shore, arises from the undertow carrying the sand seawards and depositing it on the shoals or banks outside of the islands.

"It may be advisable here to advert to a popular error which assumes that the depth of water in which an iceberg grounds is indicated by the height of the berg above the level of the sea. It is commonly stated that while there is one ninth above there will be eight ninths of the berg below the sea-level. This is approximately

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true only with regard to volume or mass of the berg, not with regard to height and depth. A berg may show an elevation of one hundred feet above water, and yet its depth below may not exceed double that amount, but its volume or mass will be about eight times the mass it shows on the surface. Hence, while icebergs ground in thirty and forty fathoms of water, they may expose a front of one hundred or one hundred and fifty feet in altitude, the broad, massive base supporting a mass about one ninth of its volume above the sea-level."

Oscillation of the Land.—From all the indications noticed casually by us, such as the position of beaches apparently very recently raised above the sea-level, so as to be just beyond the reach of the waves, the land is slowly gaining on the sea. The Rev. C. C. Carpenter, missionary at Caribou Island, in the Strait of Belle Isle, also informs me that this is his impression, gained both from his observations and information given by the settlers. To this last source Mr. J. F. Campbell is indebted for the statement in his "Frost and Fire," that the coast of Labrador is slowly rising. On the other hand, the land appears to be sinking about Hudson's Strait.

In Dr. Bell's Report for 1884 of Lieut. Gordon's Hudson's Bay Expedition, it is stated that ancient stone structures, erected by the Eskimos, were observed, and Dr. Bell remarks: "From what I have seen of the situations which the Eskimos in various places in Hudson's Bay and Strait choose for their camps, there appeared to be little doubt that they had lived here when the sea-level was twenty to thirty feet higher than it is at present."

River Terrace Period.—Owing to the great denuda-

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tion of all drift material, and the hilly character of the country, we find no broad terraced river valleys, such as characterize more temperate regions. On the contrary, the rivers are a succession of ponds, connected by rapids, where the stream plunges from one rocky terrace to the next one below, taking the direction of natural ravines. Though the volume of these rivers during the Terrace epoch, or period of great rivers, may have been greater than now, as evidenced by a few small terraces upon their banks, we have no evidence that they ran in much wider channels than at present, owing to the great height of their banks.

The Occurrence of the Leda Clays in Labrador.—At the mouth of Salmon River, a small stream flowing into the Strait of Belle Isle three miles east of the mouth of the Esquimaux River, occurred a clay-bank about ten feet high, and situated just above high-water mark, which was dark blue and free from bowlders. It contained in abundance *Aporrhais occidentalis*, *Serripes grönlandicus*, and *Cardium Hayesii*.

This deposit of clay is of more recent age than the deposits noticed below, as it was a few feet higher, and situated more inland. It undoubtedly rests upon the lower fossiliferous gravel-beds, though I did not see the point of contact.

The most important deposits occurred at Caribou Island at the mouth of the Strait of Belle Isle, at Pitt's Arm in Château Bay, and at Hopedale. They consisted of sandy clays and a coarse gravel found between tide marks, and extending beneath the water. Should the present banks now lying off the coast be raised and exposed to view, we would have an identical deposit. All

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the stones and pebbles of this ancient sea-bottom, finely exposed at Hopedale, are covered with nullipores and polyzoa; the *Mya truncata* still remains perpendicular in its holes, and the most delicate shells, with their epidermis still on, are unbroken, and their valves often united by the ligament. The delicate Myriozoum has preserved its fine markings nearly as perfectly as in specimens dredged at the present day, and the cases of the delicate Spiochætopterus are still preserved. It is evident that this deposit has slowly and almost imperceptibly risen some four hundred or five hundred feet, without any paroxysmal movement of the continent, over an extent of coast some six hundred miles in length.

This rise of the Labrador peninsula must have accompanied the rise of the polar regions, including Arctic America and Greenland, and in fact all the land lying in the northern hemisphere. Many facts in the distribution of fossils in these glacial beds, and the present relations of these beds to deposits above and beneath them, tend to prove that the glacial epoch occurred simultaneously over all the arctic regions and the northern temperate zone, and that the submergence and subsequent rise of the continental masses and outlying islands were synchronous in both hemispheres. Professor Haughton has summed up the evidence of such a rise from raised beaches and ancient sea-bottoms in the American Arctic Archipelago.* The researches of Dr.

* "McClure found shells of the *Cyprina islandica*, at the summit of the Coxcomb Range, in Baring Island, at an elevation of five hundred feet above the sea-level; Captain Parry, also, has recorded the occurrence of *Venus* (probably *Cyprina islandica*) on Byam Martin's Island; and in the recent voyage of the

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Kane in the extreme north of Greenland enabled him "to assert positively the interesting fact of a secular elevation [480 feet] of the crust commencing at some as yet undetermined point north of 76°, and continuing to the Great Glacier and the high northern latitudes of Grinnell Land." (Vol. ii. p. 81.)

We need not here allude to the similar oscillations in northern and central Europe to still greater heights above the present level of the ocean.

At various points along the coast from Caribou Island, where they were abundant, to Hopedale, occurred in the drift gravel beds associated with the fossils, numerous pebbles and small bowlders of a light silicious bedded limestone, which contained numerous Silurian fossils. Lieber mentions finding pieces of limestone on the shore of Aulezavik Island. There can be little doubt that these bowlders were transported on ice from the Silurian basins in the arctic regions on the west side of Baffin's Bay. Perhaps their origin may by future observers be traced to the Silurian limestones found at the head of Frobisher's Bay by Hall. Such fragments are not now to be seen on the floe-ice coming down from the north.

A large proportion of the species mentioned in the following lists (reprinted from the Memoirs of the Boston Society of Natural History, i. 231–234) occurred in great abundance and in a good state of preservation, so that they could be compared very satisfactorily with

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'Fox,' Dr. Walker, the surgeon of the expedition, found the following sub-fossil shells at Port Kennedy, at elevations of from one hundred to five hundred feet: *Saxicava rugosa*, *Tellina proxima*, *Astarte arctica* (borealis), *Mya uddevallensis*, *Mya truncata*, *Cardium sp.*, *Buccinum undatum*, *Acmea testudinalis*, *Balanus uddevallensis*."—*Appendix to McClintock's Narrative.* (Amer. edit. p. 370.)

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recent specimens dredged upon the coast. Most of the species, after careful and repeated comparisons with the recent examples, did not present any appreciable differences. In a few instances there were characters found by which the fossils could be distinguished from the recent shells of the same species, and those I have carefully enumerated.

Nullipora polymorpha Linn. This plant occurred abundantly at Caribou Island. At Hopedale it was profusely abundant, growing in large free masses or encrusting shells and stones.

Euryechinus dröbachiensis Verrill. (*Toxopneustes dröbachiensis* A. Agassiz. *Echinus granularis* Say.) Fragments of the shells and numerous spines occurred abundantly at Caribou Island and Hopedale.

Lepralia Belli Dawson. Encrusting pebbles at Hopedale. One colony also on a shell. The young cells were large, with crowded and sometimes perforate, granulated conical ovicells. The avicularia are situated either in front of the opening or crowded to one side, and are two in number. Both old and young correspond precisely with a specimen received from Dr. Dawson.

Lepralia pertusa Thompson. This species occurred on the shells of *Buccinum cretaceum.* It agrees well with the large, oblong and coarsely punctate recent specimens. It is well figured by Dawson in the *Canadian Naturalist and Geologist*, Feb. 1859, p. 15, fig. 16.

Lepralia ciliata Johnst. This form also occurred frequently with the preceding. The cells are convex, the avicularia are present, projecting over the aperture. The surface is punctate.

Celleporaria surcularis Packard, Can. Nat. Dec. 1863,

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p. 410. Occurred frequently on Lamellibranch shells in large and thick masses at Caribou Island and Hopedale.

Myriozoum subgracile D'Orbigny. (*Millepora truncata* Fabr., Faun. Grœnl.) Fragments of the stems of this graceful species occurred abundantly at both localities.

Rhynconella psittacea (Gm.). Perfect valves were found at Caribou Island, and others were given me which were reported to have been found three miles from the mouth of the Esquimaux River. Other shells, such as a *Cardium* and *Cardita borealis*, also came from the same place, showing that they had been washed out of a drift disposit on the river. This species was abundant at Hopedale, where the valves adhered by their ligament.

Pecten islandicus Linn. This was not common. Several ponderous valves, larger than I have seen elsewhere, had the ribs united into groups of two or three, separated by sulci of equal width; but in young and fragile subjects the ribs were equally distributed, and differed in no respect from the living young, or from those of the same age, from the drift clays of Maine and New Brunswick.

Yoldia myalis Stimps. A specimen of *Yoldia arctica*, received from Dr. Lütken, approaches *Y. myalis* more than *Y. sapotilla*. It is however, longer, and the lunule is not so short and deep as in *Y. myalis*. One valve. Hopedale.

Leda minuta Möll. (*Arca minuta* Fabr., Faun. Grœnl.) Caribou Island, rare. Common at Hopedale.

Modiolaria discrepans Möll. One broken valve. Hopedale.

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Mytilus edulis Linn. Fragments of large valves were abundant, but young shells were uncommon.

Cardium Hayesii Stimps. Proc. Acad. Nat. Sc. Philad. p. 581, 1862. This species occurred both at Hopedale and Caribou Island.

Serripes grönlandicus (Chemn.) Beck. Caribou Island, frequent. Château Bay.

Astarte Banksii Leach, Zoöl. Beechy's Voyage. (*A. Warhami* Hancock, Ann. Mag. Nat. Hist., vol. xviii., 1846, p. 336, pl. v., figs. 15, 16. *A. Richardsoni* Reeve, Last of the Arctic Voyagers, ii. App. *A. fabula* Reeve, l. c.; *A. Laurentiana* Lyell; *A. compressa* Daws.,—not of European authors.) A fine series of specimens, recent and fossil, from Labrador, and fossil from Maine and the river St. Lawrence, has convinced me that the numerous variations of form which this species assumes are of local origin, arising from differences in habitat or age. Among a number of *A. Laurentiana* Lyell, received from Montreal through the kindness of Dr. Dawson, are some thinner and more finely striated than usual, but I have recent specimens and also fossils from Labrador agreeing with them. The species varies in the length of the shell and the form of the posterior end, but the shape of the anterior end, the sulci and the hinge characters are in all the varieties very constant.

Very elongated forms are like *A. Warhami* Hancock, which we would consider as a synonym of this species. The varieties *A. Richardsoni* and *A. fabula* have occurred in the same locality, at Dumplin Harbor at the mouth of Sandwich Bay, Labrador, where I have dredged them alive.

Astarte striata Gray. One specimen from Hopedale.

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It did not differ from drift shells found at Brunswick, Maine. This shell, as it occurs fossil, is thicker, more ponderous, more equilaterally triangular; the beaks are directed more anteriorly, the teeth are much larger, and the lunule broader and shorter, than in *A. Banksii.*

Astarte compressa Linn. (*A. elliptica* Brown.) Common in all the beds, but not so abundant as *A. Banksii.*

Cardita borealis Conr. Very abundant with the preceding.

Macoma sabulosa Mörch. (*Tellina proxima* Brown.) Of frequent occurrence.

Cyrtodaria siliqua Daudin. Several valves at Caribou Island.

Panopæa norvegica Sprengel. A perfect valve of this shell occurred at Caribou Island.

Mya truncata Linn. Both the short and common elongated varieties of this species occurred, especially at Hopedale, in great profusion.

Saxicava arctica Desh. Large valves occurred in great profusion in all these beds.

Chiton marmoreus O. Fabr. Several valves were found at Hopedale.

Acmaea testudinalis (Müll.). One specimen occurred, encrusted with Nullipora.

Lepeca cæca Möll. (*P. candida* Couth.; *P. cerea* Möller, Reeve.) Frequent.

Puncturella noachina (Leach). (*Diadora noachina* Gray.) Frequent.

Margarita cinerea (Couth.). One specimen. Hopedale.

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Margarita varicosa (Mighl. et Adams). Frequent at Hopedale and Caribou Island.

Turritella erosa Couth. As numerous in proportion to the succeeding species as at present on the coast.

Turritella reticulata Mighl. et Adams. (*T. lactea* Möll.) Profusely abundant in both places.

Turritellopsis acicula (Stimps.). One specimen. Caribou Island.

Aporrhais occidentalis Beck. Several. Caribou Island.

Lunatia grönlandica Möll. Frequent.

Natica clausa Sowb. Frequent.

Admete viridula Stimps. At Caribou Island.

Bela robusta Pack. No specimens of this species occurred at Caribou Island associated with the other species; it seems quite rare, and has not occurred in a living state. Though very distinct from any of the other species, it might be mistaken for a very much shortened and thickened *B. americana.* It is much shorter and broader than *B. americana;* the whorls are five in number, angulated, giving the shell a well-marked turretted form; the fourth whorl is one half to two thirds as long as the first, which is unusually large in proportion to the rest of the shell. The aperture is broad, regularly ovate; canal long, narrow, oblique, and not gradually widening towards the aperture. It has much fewer ribs than *B. americana,* there being thirteen on the lower whorl, where in *B. americana* are eighteen. Length .18; breadth .11 inch.

Bela americana Packard. (*Fusus turriculus* Gould, Invert. Mass. *Bela scalaris* Packard, Can. Nat. and Geol. 1863,—not of Möll., Index Mollusc. Grönl.) *Va-*

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riety. One specimen occurred fossil at Caribou Island which differed in no respect from a recent specimen dredged in fifteen to thirty fathoms at Square Island, which will be further noticed below.

Bela exarata Möll. (*Defrancia exarata* Möll., Index Mollusc. Grönl.; *Pleurotoma rugulatus* "Möll." Reeve, Icon. Conch. f. 345.) Caribou Island. Common.

Bela Woodiana Möll. (*Pleurotoma harpularia* Couth., Bost. Journ. ii., p. 183. *Pleurotoma leucostoma* Reeve, Icon. Conch. f. 278.) Caribou Island. The most common species of the genus in these deposits, though very rarely found living by us; it is of large size and much eroded.

Bela decussata (Couth.). It occurred very rarely at Caribou Island.

Bela pyramidalis (Ström.). (*Pleurotoma rufa* Couth.) Not common; at Hopedale and Caribou Island.

Bela violacea Mighl. et Adams. (*Defrancia cylindracea* Möll. Ind. Moll. Grönl.; *Pleurotoma grönlandica* Reeve, l. c. fig. 343.) Of common occurrence at Caribou Island.

Buccinum glaciale Linn. Caribou Island, an imperfect specimen.

Buccinum grönlandicum Hancock. Annals and Mag. Nat. Hist. xviii. p. 329, pl. v., figs. 8, 9, 1846. Pitt's Arm, head of Château Bay; one specimen, with the outer coating of shell worn off.

Buccinum tenue Gray. (*Buccinum scalariforme* Beck, Stimps., Can. Nat., Oct. 1865, p. 14.) One specimen occurred at Caribou Island, wanting the lip and spire, but showing well the abbreviated longitudinal waves characteristic of the species.

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Buccinum undatum Linn. (*B. undatum* Greene, Gould, Dawson; *B. labradorense* Reeve, Packard, Can. Nat. viii. p. 416, 1863.)

Tritonofusus cretaceus (*Buccinum cretaceum* Reeve, Icon. Conch; Packard, Can. Nat. viii., p. 417, pl. ii. fig. 6, 1863.) This interesting species, now found not uncommonly on the coast of Labrador, also occurs fossil not unfrequently at Caribou Island. It differs in no respect from living forms.



TRITONOFUSUS CRETACEUS.

Fusus (*Neptunea*) *tornatus* Gould. Rarely found fossil at Caribou Island, and in the blue clay at the mouth of Salmon River.

Fusus (*Neptunea*) *labradorensis* Pack. Shell fusiform; whorls moderately convex, sutures deeply impressed, the upper ones somewhat flattened, spire elongated, acute, lower whorl ventricose, covered with rather coarse revolving striæ. On the lower whorl are twenty nearly straight, coarse, flattened folds, which on the succeeding whorls run the entire length of each whorl. Aperture ovate, columella concave, smooth; canal moderately long, oblique, slightly tortuous, spire a little longer than the shell. Length, one inch; breadth .48 inch. One specimen at Caribou Island. It differs from *Fusus pullus* Reeve (fig. 89) in being apparently a much thicker shell, in the longer canal, and in the more ventricose body of the shell, with the coarser revolving lines.

Fusus tortuosus Reeve, Belcher's Last of the Arctic Voyagers, ii., p. 394, pl. 32, fig. 5. Our specimens dif-

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fer from the description, in the absence of the long tortuous canal which gives the species its name. The fossils have the same convexity of the whorls, which are covered by similar revolving striæ; but the first whorl is less contracted at the origin of the canal, and the canal itself is from half to two thirds the length of the first whorl, while in *F. tortuosus* the canal nearly equals the length of the whorl. In this respect it approaches *Fusus pygmæus* Gould, from which it is distinguished by its size, the greater convexity of its whorls, and the deeply impressed revolving lines.

This was a frequent shell in the gravel deposit on Caribou Island, and large specimens measured nearly three inches in length.

Trichotropis borealis Sowb. et Brod. Not uncommon at Hopedale and Caribou Island.

Spirorbis glomerata Müll. Occurred as usual on shells at Caribou Island.

S. vitrea Stimps. Only young and flattened specimens occurred.

Spiochætopterus typus Sars, Fauna littoralis, ii. Fragments of tubes belonging apparently to this worm were found fossil at Caribou Island.

Balanus porcatus Da Costa. Numerous fragments occurred at Caribou Island and Hopedale.

In the above list occur several forms of great interest which have not been found fossil elsewhere, or in no such profusion, and seem to be perhaps characteristic of this fauna and to have had their metropolis either in this area or in Arctic America, in contradistinction from Arctic Europe. Such are

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Cardita borealis	*Bela exarata,*
Astarte Banksii,	*Bela woodiana,*
Margarita varicosa,	*Bela robusta,*
Turritella recticulata,	*Bela americana,*
Turritella erosa,	*Fusus tortuosus,*
Aporrhais occidentalis,	*Fusus labradorensis,*
Admete viridula,	*Buccinum undulatum,*

Tritonofusus cretaceus.

From this list the polyzoa are excluded, since no species are recorded from Greenland, except by Otho Fabricius in the Fauna Grönlandica.

Upon comparing this list with that of the species comprised in the present fauna of Labrador, we can observe how similar are the two faunæ, and how persistently the characters of the earlier of the two have survived the important changes this region has undergone since the glacial epoch. We have here the present Syrtensian* or Newfoundland Banks fauna in its purity, without the intermixture of the few southern forms that have subsequently encroached upon its limits. We shall below show where it shaded almost imperceptibly into the Acadian fauna, its nearest southern neighbor; but now we have to determine its most northern limits.

Fortunately Möller, in his "Index Molluscorum Grönlandiæ," and Rink,† have noticed the few fossils

* We have applied the term Syrtensian to the subarctic assemblage of marine animals characterizing the Banks of Newfoundland, of Nova Scotia, and the coast of Southern Labrador and of Newfoundland. It is a subdivision of the Arctic fauna, being in some respects intermediate between the Arctic and Boreal faunæ.

† Udsigt over Nordgrönlands Geognosi af H. Rink. *Viden. Selsk. Skrifter, Kjöbenhavn,* 1853, p. 96. The species were identified by Dr. O. A. L. Mörch.

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which have occurred in the Quaternary clays of southern Greenland, a list of which is here given.

Pecten islandicus,
Leda minuta,
Mytilus edulis,
Modiolaria discors,
Astarte semisulcata Leach,
Astarte corrugata Brown,
Cardium (*Aphrodite*) *grönlandicum*,
Cardium islandicum,
Cryptodon flexuosus,
Cyrtodaria siliqua,
Mya truncata,
Mya arenaria,
Panopæa norvegica,
Saxicava arctica,
Tellina calcarea,
Tellina fragilis, (*grönlandica*),
Natica clausa B. & S.,
Littorina grönlandica,
Fusus despectus Linn,
Margarita glauca,
Fusus gracilis Da Costa.

By reference to the lists of fossil shells found in the clays of the New England and Labrador coasts it will be seen that during the Quaternary of the French and Scandinavian geologists, or post-pliocene period of Lyell, the distribution of marine animals was governed by the same laws as at the present day. In going southward from Labrador to New York the seas became warmer the more they came in contact with the heated waters of the Gulf Stream, whose influence was slightly exerted on the coast of New England during the glacial period. The climate of New England was not purely arctic, but rather sub-arctic, where now it is "boreal." While this period was characterized by the wide distribution of what are now purely arctic or circumpolar species, there were also intermingled boreal or Acadian forms. Thus the arctic *Leda arctica*, *Pecten grönlandicus*, *Serripes grönlandicus*, *Pandorina arenosa*, and *Fusus tornatus*

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were then widespread and most characteristic shells from Greenland to Portland, Maine. The Leda especially, abounding in every clay deposit, has now become wholly extinct south of Spitzbergen and the 70th parallel of latitude.

An exceedingly small percentage, if any, of the species has become *wholly* extinct, the only instances occurring to us being the *Beluga vermontana*, about which there must be great doubt, since owing to the difficulty of distinguishing the fossil species of whales, it may be the common white whale and the new species of *Fusus* (*F. labradorensis*), and, possibly, *Bela robusta*, described above.

A considerable number have become extinct in the north temperate seas, owing to the great changes in the climatic conditions. A parallel case is shown in the southward migration and subsequent extinction in Europe of the musk-ox, polar bear, lemming, and other quadrupeds now confined mostly within the limits of the arctic circle.

During the glacial period, or that of the deposition of the glacial beds (Leda clay of Dawson), which are unmistakably rewashed terminal moraines left during the incoming or coldest period of the Quaternary (when, we have every reason to believe, true glaciers of great extent eroded the present river systems as far south as New York, the southern limits of the ice having been indicated by Clarence King, Prof. G. F. Wright, and others), there was a greater uniformity than now of the climate; but yet, as shown by the distribution of animal life, there was a decided change from a purely arctic to a sub-arctic climate, from Greenland southward.

At present, the arctic or circumpolar fauna is restricted

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to a district north of the yearly isothermal line of 32°, which thus includes the Arctic-American Archipelago, northern Greenland, Spitzbergen, Nova Zembla, and the coast of Siberia. This is a true *circumpolar* fauna, and can scarcely be said to be Asiatic, European, or American, though members of the group extend in diminished numbers and size down on the Asiatic coast, to Japan, as we are informed by Dr. W. Stimpson and by P. P. Carpenter in the Report of the British Association for 1856; on the European coast as far as the Mediterranean Sea, and on the eastern American coast as far as New Jersey, where the polar currents give, at great depths, the necessary amount of cold for their existence. South of this circumpolar belt is a sub-arctic zone of life corresponding to the yearly isothermal of 40°. This line starts from near Cape Breton in North America, and includes Iceland, the Hebrides, the Faroe Islands, Finmark, and northern Norway. On the American coast this fauna is characterized by a small number of species not yet recorded as found in the circumpolar district, which only occur southward in the Acadian district in diminished numbers and impoverished in size. This Syrtensian fauna bears the same relations to that of the Acadian district as that of Finmark (judging from the data furnished us in the papers of Professor Sars) does to that of the Baltic, North, and Scottish Seas, the boreal or Celtic fauna of Forbes, and which is the European representative of the Acadian fauna. We have shown* that this fauna is limited to Hudson's Bay, the coast of Labrador, and the northern coast of New-

* *Canadian Naturalist and Geologist*, Dec., 1863. See also the *Proc. Bost. Soc. Nat. Hist.*, Jan. 1866, p. 276.

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foundland. Southward it follows the line of floating ice, which partially excludes Anticosti, but includes both the Grand Banks and those shoals lying to the southwestward along the track of the polar current, which on the coast of New England flows between the coast and the inner edge of the Gulf Stream; along this line lie the Banks, off Nova Scotia, and Maine, and Massachusetts, together with the St. George's Banks and the Nantucket Shoals. Its influence is likewise felt as far south as the shoals lying off the coast of New Jersey. This current would even seem to impinge slightly upon the north side of Cape Hatteras, where Redfield supposes its final influence to have been felt. Returning again to the shores of the British colonies, we find this *Shoal* or Syrtensian fauna most curiously interwedged with the Acadian or New England fauna. This is owing, without doubt, to the overlapping of the Gulf Stream upon the great polar current. Thus, while the mouth of the Bay of Fundy is properly a Syrtensian outlier, the head of the bay, the coast of New Brunswick, the western side of the Gulf of St. Lawrence, the mouth of the river St. Lawrence on its southern side, and a small isolated area on the southern coast of Newfoundland, sheltered from the polar current sweeping by Cape Race, and on which a small branch of the Gulf Stream may possibly impinge, are outlying areas inhabited by species most characteristic of the coast of New England north of Cape Cod, constituting a fauna termed by Professor Dana the Nova Scotian Fauna, and by Lütken, the Acadian Fauna. Thus between Greenland and Cape Cod there are two distinct faunæ: the Acadian, with outliers situated north of 'its normal limits, due to the influence

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of the Gulf Stream, or, perhaps, to the absence of the polar current; and the Arctic (Syrtensian or Labrador fauna), peopling the coast of Labrador and Newfoundland, sending outliers far southwards, due to the influence of the polar current.

Having shown how these three faunæ are limited at the present day, it remains to notice how this distribution differed in Quaternary times. The arctic or polar current must have sent a branch through the present course of the St. Lawrence River into Lake Champlain, in a general southwestern direction. This current was evidently a continuation of the present Belle Isle current, which even now pushes the cold waters of the Strait far up beyond the island of Anticosti beneath the fresh waters of the St. Lawrence River. It has been noticed by Dr. Dawson,† who has satisfactorily shown the effects of this powerful St. Lawrence current, that the post-tertiary fauna of the St. Lawrence, as it has been studied by him at Montreal, Rivière du Loup, and Quebec, was in all its features purely Syrtensian, and identical with that of the colder portions of the Gulf of St. Lawrence, and especially the coast of Labrador.

The clay beds of Canada synchronize and agree in their general features very nearly with those of Maine, as has been already observed by Dr. Dawson. All the beds to the eastward of the Saco River afford a Labrador fauna. About Portland and on the Saco River we are, however, on the limits of the post-tertiary Acadian

† Address of Principal Dawson before the Natural History Society of Montreal, May, 1864, published in the *Canadian Naturalist*, where he shows that the general southwest striation of the valley was "from the ocean toward the interior against the slope of the St. Lawrence valley." (p. 9.)

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fauna. Certain common Syrtensian and purely arctic forms there dwindle in size and diminish very sensibly in numbers, and a few arctic species are replaced by Acadian forms.

At Point Shirley we have good evidence of the beginning of the Virginian fauna, where *Venus mercenaria* and *Buccinum plicosum* abound. This must have been the northern limits of the fauna so well developed, as noticed by Desor, in the beds of Nantucket, where the temperature of the sea could have scarcely differed from that of the present period. The same may be said of the post-tertiary fauna of South Carolina, and, from what little we know, of that of Florida, where the heated Gulf Stream evidently preserved the same conditions as now, only more checked in its northern limits than at present by impinging more directly on a coast lined with floating ice, as that of Maine must have been in post-tertiary times.

At such a time the increased degree of moisture must have produced a much greater rainfall, the fogs must have been of greater extent, and the snow line must have approached much nearer the sea, than at present, on the eastern coast of America, south of lat. 60°, and glaciers of great extent must have surrounded the mountains of New England. The land fauna and flora of New England must have been that of Labrador. The Greenland seal (*Phoca* [*Pagophilus*] *grœnlandica*), the *Beluga vermontana*, and among plants the *Potentilla tridentata* and *Arenaria grœnlandica* (both of which are now found in the colder parts of the coast of Maine) must have been the characteristic species. Remnants of such a flora and fauna we now behold on our alpine summits.

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On the top of Mount Washington, the last five hundred feet exhibit a purely sub-arctic or Labrador vegetation. We can scarcely call it arctic, for the dwarf spruces and firs are of the same size as in the more unprotected places in Labrador. The same species of weasel which abounds in Labrador we have seen on the summit of Mount Washington. The insect fauna we must believe is an outlier of the Labrador sub-arctic assemblage of insects, though with certain features of its own. While some Diptera, Coleoptera, and Lepidoptera are identical, certain species, such as *Chionobas semidea*, *Argynnis montinus* Scudder, differ slightly from any yet found in Labrador, though they may yet be found farther north, or may prove to be local species, remnants of a sub-arctic fauna which peopled the surface of New England, living between the coast and the snow line in the interior. As the line of perpetual snow retreated up the mountain sides, the more hardy species followed, while many others doubtless died in the great changes of climate and topography which ushered in the historic period. As there are aerial or alpine outliers, relics of this ancient sub-arctic fauna and flora, so we must consider the present abyssal forms, and outliers of the Labrador marine fauna,—such as inhabited the Banks of Nova Scotia and northern New England, and the cold waters of the mouth of the Bay of Fundy,—as the remnants of the Syrtensian fauna, which during the glacial period must have been spread very uniformly over this area.

The arctic sea-birds even now breed upon the islands in the mouth of the Bay of Fundy, as they do on the coast of Labrador. I am told by fishermen that the Puffin, *Mormon arctica*, used to breed on Mount Desert.

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The *Alca impennis* was probably a common bird, as it was once on the shores of Scandinavia and Scotland; there are rumors extant among our oldest fishermen of its having been seen years ago, but within the recollection of men now living, as I am informed by Professor A. E. Verrill; and its bones have occurred in the kitchen-middings of the coast of Nova Scotia and of Massachusetts at Ipswich. It is known by Rev. Mr. Wilson, a missionary in Newfoundland, to have been common less than forty years ago about the Fogo Islands, on the northeastern shore of Newfoundland, as I have been informed by Mr. G. A. Boardman of Calais, Maine. These birds represent the sub-arctic avi-fauna of New England during the later period of the drift, and owe their extinction possibly to the slow changes of the climate, which must have been gradually ameliorating for two centuries past in the north temperate zone, but more especially to their destruction by man.

All the facts cited above must at least tend to disprove any theory of a former tertiary or post-tertiary continental connection between Europe and America. The fauna and flora of Labrador during the glacial period were too distinct, the oceanic currents could not have allowed any interchange of forms, and the great depth of the sea in Baffin's Bay would have prevented such migrations as Forbes supposed to have taken place from Europe.

The geological history of the American continent, as laid down so clearly by Professor Dana in the Proceedings of the American Association for the Advancement of Science for 1856, proves that the different formations were, during paleozoic, mesozoic, and tertiary times, built around the granitic laurentian nucleus of British

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America, and gradually proceeded southward. All the tertiary rocks form narrow strips of land along the coast. No well-informed geologist can believe that the tertiary strata formed continuous sea-bottoms,—that, for instance, the miocene beds of Spitzbergen were continuous with those of Disco Island in Greenland, or that the Greenland beds are a part of the miocene strata of the Southern States. Equally unfounded on general geological principles seems the theory of a tertiary Atlantis, advanced some years ago, especially by Heer and others, though first proposed by Forbes, to account for the distribution of life in the Azores and the islands lying off the mouth of the Mediterranean Sea. In fact, the fauna as we go southward from the arctic zone becomes more and more distinct, and it is probable that such distinctions obtained from the earliest palæozoic times. The Silurian fauna of Europe is nearly as distinct from that of North America as the tertiary fauna of England and France is from that of Virginia, as in the latter case insisted on by Sir Charles Lyell in the Quarterly Journal of the Geological Society for 1845.

During glacial times, the cave-bear, lion, hyena, an aurochs were associated in Europe with the musk-ox reindeer, and polar bear. It cannot be said that th glacial fauna of America was derived by immigration from Europe, for not a single feature peculiarly European in its type is found in our post-tertiary beds. On the other hand, the glacial fauna of northern Europe was essentially Arctic-European or "palæarctic." Because the musk-ox is found fossil in the turbaries of France and gravels of Germany, it need not be inferred that the European fauna of that period borrowed an

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American feature. We would rather suppose that the former range of the musk-ox, a circumpolar species, was Arctic-European as well as American. In considering the origin of the flora of Labrador, though not possessing a special knowledge of the botany, we would on general principles venture to dissent from the view of Dr. Hooker, that the flora of northeastern Arctic America is essentially Scandinavian in its origin.

The flora of Labrador, so far as we were enabled to observe, follows closely the laws of distribution of the land and sea animals; and any theory that separates the origin of the two assemblages cannot be in accordance with the general laws of the distribution of life, be it plant or animal, over the surface of the globe. The fauna of Australasia is no less peculiar than its flora; the flora of Brazil is characterized by its peculiar tropical American forms, just as the fauna is circumscribed by peculiar features. So we must believe that the origin of the Arctic-European and Arctic-American and Arctic-Asiatic floras and faunas was distinct from the outset, and that they have never borrowed, by extensive inter-continental migrations, each other's peculiar characteristics. As we have observed in regard to the animals, there are a very large proportion of arctic plants spread over the whole arctic zone, which cannot be said to be American any more than European or Asiatic, but simply circumpolar. On the other hand, there is a small percentage of which the reverse is true, and this is paralleled among the animals.

Sir J. D. Hooker, in his elaborate essay on the Distribution of Arctic Plants in the Linnean Transactions for 1861, accounts for the greater richness of the flora of

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Lapland over that of other arctic regions by the blending of warm and cold currents of air and water, and its great diversity of mountains and lowlands; while on the broad plains of Siberia and the level plateau of Labrador there is the greatest uniformity of climate, and hence a corresponding paucity of plants.

The same climatic conditions determine the distribution of marine life. As we go from Norway to Greenland the number of species lessens greatly. Dr. Lütken, in his admirable View of the Echinoderms of Greenland, shows that the fauna is essentially Arctic-American rather than European. It is so with the other radiates, and the articulate and molluscan fauna, and the fish fauna would seem to follow the same law.

Dr. Hooker cites fifty-seven species of plants which do not cross from Greenland to America. This is paralleled by the apparent restriction of a few species of marine invertebrates to the high polar seas, such as the *Leda truncata* and *Pecten grœnlandicus*, though in glacial times they abounded in northeastern America.

Among the most purely Arctic-American plants are the *Potentilla tridentata*, which is abundant in Greenland and which we have collected in profusion in Labrador, Maine, and on the White Mountains; also the *Arenaria grœnlandica*, which is more thoroughly arctic, preferring the coldest spots on the outer islands of the coast of Labrador, and the alpine summit of Mount Washington, and which has even been detected on Cape Elizabeth, Me.

These two plants—which Dr. Hooker acknowledges have never occurred elsewhere on the globe within the historic period—he supposes were originally from Scan-

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dinavia, though they have never been found in Europe. By this mode of reasoning we might just as well imagine the clam, *Mya arenaria*, to have been derived originally from Europe, or the bison to have been derived from the aurochs of Europe. The presence of such characteristic Arctic-American forms in Greenland must destroy our confidence in the supposed identity of the Greenland flora with that of Lapland, for there are strong grounds for regarding the flora of Greenland as arctic and circumpolar simply, rather than European-Arctic, and that on either side the flora becomes more strongly either American or European, as we go westward or eastward of Greenland.*

When, following the line of the yearly isothermal of 32°, we go to the southward on either side of the Atlantic, we find warm and cold currents of air and water intermingling, and thus producing much greater diversity of climate than in Greenland. While the Gulf Stream abuts directly upon Scandinavia, some of its effects are felt in Newfoundland and Labrador. Both lands are continental, and shade into temperate regions. There is a very perfect correspondence in the geology and distribution of the formations, and hence, as Hooker observes, there are a large number (230) of plants, common to Labrador and Scandinavia, which do not occur in Greenland. This is parallelled very exactly in the distribution of animal life. In the seas of Labrador and Newfoundland are found forms derived from the more temperate seas of New England, as on the coast of

* In a paper by Eug. Warming in Engler's Jahrbücher, x. 1889, on the flora of Greenland, the author concludes that Greenland is not a European province but has nearer relations to America. (*Nature*, May 30, 1889. p. 117.)

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Norway many forms occur which are derived from the British seas, and are even found as far south as the Mediterranean. These serve greatly to swell the lists. In fact the facies of the flora of Labrador is *sub-arctic* and by no means purely arctic, as is that of Greenland. Explained in this way the flora of Greenland seems to us no more anomalous than its colder climate and remoteness from sub-arctic lands, isolated as it ever has been by deep seas and powerful oceanic currents of different temperatures, which, we must believe, served from very early times as barriers against the commingling of more temperate forms of life with purely circumpolar species.

There is, in our view, no reason to believe that the glacial period, as some writers have suggested, has shifted from the eastern to the western hemisphere, or *vice versâ;* for the same causes which brought on the cold period were evidently common to the arctic and sub-arctic regions throughout their whole extent, though governed greatly by the present distribution of the isothermal lines. That the drift deposits were laid down contemporaneously on both sides of the Atlantic, seems proved by such facts as this: that *Leda arctica* (*L. portlandica*), more than any other shell characteristic of the drift deposits of the northern portions of America and Europe, has become alike extinct both in Scandinavia and its equivalent, Labrador, Canada, and New England.

The break in the glacial beds—which by Sars* (in which he closely follows D'Archiac) are divided into an

* Om de i Norge forekommende fossile Dyrelevninger fra Quartærperioden, etc.; af M. Sars, Christiania, 1865.

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earlier Quaternary or "*glacial*" formation, from which few fossils have been taken, and those purely arctic in character, and the more recent beds, "post-glacial," resting upon them, containing a great influx of *boreal* or sub-arctic and some Lusitanico-Mediterranean species—does not seem so distinctly marked in northeastern America as in Europe. In southern England the able researches of Mr. Searles V. Wood, Jun., enable this writer to "arrive at the conclusion that the widespread bowlder clay of England is wholly distinct from the older, but partially developed drift of the Cromer coast. That conclusion was arrived at by the minute examination of more than eight thousand square miles of the eastern portion of England, and the grounds for it were submitted to geologists in a detailed map of the drift beds over the whole of that area, with copious sections. It was thus that I acquired the opinion which induces me to deny, as I do, 'that we have yet any evidence of any general submergence at the incoming of the glacial period, far less of repeated oscillations of submergence and emergence.' . . . Now although I have endeavored to show that on the east coast of England four oscillations of climate have occurred since the incidence of the glacial period, viz.: first, the extreme cold of the Cromer drift when the country except a part of Norfolk was land; second, the ameliorated climate of the sand and gravel series, which overlies that drift unconformably, and partially underlies the bowlder clay; third, the return of cold with the extensive submergence which introduced the widespread formation of bowlder clay; and fourth, the return to sand and gravel conditions, with the elevation and denudation of that clay and the

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introduction of the post-glacial series—yet the oscillations of climate during the tertiary period begin as well as end with these."—*The Reader*, London, 1865, p. 466.

Having the grand outlines of this formation thus mapped out for us, it remains for geologists in this country to see how far the parallel can be carried out in America. There is as yet everything to be learned of the lowest and oldest bowlder clay of the coast of Maine; to ascertain how far it is conformable with the brickyard clays of the uplands, and whether there is an overlying bed of sand such as the sheets of sand resting everywhere on the upper bowlder clay. At present there have been revealed no signs of this lower bed of sand clay, and the lowest clay beds we are acquainted with seem to graduate into the rewashed, more inland, and more recent bowlder or brickyard clays.

In adopting the term *Quaternary Period*, we would use it in the amended sense proposed by D'Archiac in 1848, in his "Histoire des Progrès de la Géologie." From his able review of all the prime characteristics so trenchantly dividing this period from the Pliocene Tertiary, we are led with that author to consider this period as rather equivalent to the Tertiary as a whole, than to either of its three subdivisions; and rather as the beginning of a new epoch or period, than the close of the Tertiary. The distinctions, as shown by D'Archiac, obtain no less in the tropics than in the high latitudes. In tropical America the period is marked off from the Tertiary by the appearance of the great mammals, the Herbivores characterizing the formation in America, and the great Carnivores the deposit of the Eastern hemisphere. About the Mediterranean the Tertiary Period closed

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with the upheaval or the Sub-Apennines of Italy, or Alps of Valais.

Professor Dana, in his "Manual of Geology," states further important distinctions, such as the rise of land in the high latitudes which had not before taken place since Palæozoic times, ushering in the period of great glaciers, and thus serving, over one half of the surface of the globe, to further separate this epoch from the Tertiary.

Another feature of this period is the great uniformity of climate over broad, continental areas, and the wide distribution in space of certain species most characteristic of the Quaternary Formation, Such are the occurrence, on both hemispheres, of the musk-ox, the Siberian mammoth (*E. primigenius*), and, among marine mollusca, of *Leda arctica* Gray, Sars (*portlandica*), which is now restricted to the circumpolar seas.

General Conclusions.—To account for all the facts which have been developed above, we must assume,—

I. That the northern portion of North America, that is, the boreal and arctic regions, stood at a much higher level above the sea than now. We have given good evidence that it stood at least three hundred and sixty feet above that level in Labrador. It would be safe to assume that the coast line stood at an elevation not falling short of six hundred feet. While this increase in the height of the land would not materially change the physiognomy of the continent north of the St. Lawrence River and Gulf, where the tableland rises abruptly from the ocean as in the arctic regions; it would effect a great alteration in the distribution of dry land south of the parallel of 50° N. Should all the present sea-bottom lying within the limits of the depth of one hundred

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fathoms be thus raised, the Gulf of St. Lawrence would be represented by a river delta, one mouth in the Straits of Belle Isle, the other flowing out between Cape Breton and Cape Ray. All the submarine plateaux, such as the Grand Bank of Newfoundland, and the banks lying off the coast of Nova Scotia, Maine, and Cape Cod, would be elevated above the sea, and probably form broad plains. Thus the effects on the distribution of life would essentially differ from those of the region north of 50° N. Such a rise and enlarged area of land would, as has been stated by physicists, produce an extension southward of an extreme arctic temperature. While the climate would be greatly lowered, we still have added the proximity of the Gulf Stream, as evidenced by the temperate rather than arctic fauna of the glacial beds of New York and Nantucket, and the more tropical assemblage of South Carolina. Such a blending of hot and cold currents of air and water must have produced even more fogs and a much greater rainfall than now, to feed the enormous glaciers which moved into the sea from off the principal water-sheds.

II. *Leda Clay.*—There was a gradual change of level in the sea. At the close of the glacial period the snow line gradually receded from the coast, and the glaciers retreated to the mountains. During the slow and gentle submergence of the land ushering in this epoch, the crude moraine matter was sorted into beds of regularly stratified clays one hundred to three hundred feet in thickness. The lowest beds consequently are the most ancient, as is also evidenced by the greater prevalence of arctic forms. During this time the sea was filled with floating ice, as at present on the Labrador coast, and the

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great polar or Labrador current exerted its full power. The temperature being so even throughout the northern hemispheres of the globe, there was a great uniformity in the distribution of life, and certain species enjoyed a wide distribution where now they are restricted to comparatively narrow areas. Toward the close of this period the Greenland seal, the walrus, and the Vermont whale (*Beluga Vermontana*), flourished. The Age of great Mammals dated from this early period. An arctic fauna and flora inhabited the coast between the sea and the low snow line, and the flora and fauna which are now found only on our alpine heights, or in cold, isolated spots on the coast of Maine and the northern lakes, then peopled the surface of New England and Canada. All the biological features of this epoch partook of an intermixture of the boreal and arctic faunas and floras that are now more distinctly circumscribed into narrower areas.

We have no evidence of an intercontinental communication with Europe during this period. Then, as now, there was a local facies imprinted on those animals whose remains have survived, exhibiting the same faunal distinctions, and even more strongly marked than now.

The close of this period was signalized by a great amelioration of climate, by broad areas of marine clays finely laminated, and having more sand and loam intermixed than in the lowest and oldest beds. This was the transition from a period of broad estuaries, and, at a late stage, of shallow seas, to the next epoch of a secular emergence. It ushered in the—

III. *Period of raised Beaches* (Saxicava Sands). This necessarily implies a great denudation of the glacial clays

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The rolled, sea-worn bowlders, shingle and sand, composing the mass of the ancient osars and beach deposits, now found at all heights from the sea-level to those of five hundred or six hundred feet, are derived from the resorting of the moraines. We thus find that the highest beaches are the oldest, and the most recent, those just above the ocean level. The temperature of the sea did not differ greatly from that of the present day. During the epoch the present distribution of the faunæ now inhabiting the temperate and arctic zones was established, and since then but little change has taken place. The fresh-water shells found about the Niagara River and other deposits in Canada, were, so far as we know, introduced at this time. Those shells found in beach deposits on the St. Lawrence River, from four hundred to five hundred feet above the present level of the river, show that but little change has taken place in the climatic relations of the land or in the distribution of the animals depending on such relations. It is evident that the Acadian fauna, once restricted to the regions south of the Saco River, during this epoch crept up the coast of Maine, extended itself along the western shores of the Gulf of St. Lawrence, and prevailed in the St. Lawrence River, and the broad estuary now represented by Lake Champlain.

The close of this period witnessed the surface of New England covered by broad lakes and ponds, with vast rivers and extensive estuaries, with deep fiords cutting up the coast-line. Its scenic features must have resembled those of Labrador at the present day.

IV. *The Terrace Epoch.* The estuaries and deep bays left beach deposits of sand and shingle, resulting

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from the drainage of the slowly rising continent. All the terraces are unconformable to the marine sands underlying them, though the highest terraces farthest from the coast may have been forming while the more recent sea-beaches were being deposited by the action of the waves and tide. Thus the early part of the Lake period is synchronous with the latter part of the Beach period. So also the lower strata of the Leda clays were laid down during the deposition of the oldest beaches, causing a constant inosculation of these unconformable deposits, and thus the beginning of one epoch overlaps the close of the previous one.

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CHAPTER XV.

THE ZOOLOGY OF THE LABRADOR COAST.

WHILE the zoology of the interior and western portions of the Labrador peninsula is undoubtedly like that of the Hudson's Bay district and the cooler portions of Canada, as well as northern Maine and New Hampshire, it presents quite different features on the treeless portions of the coast, and on the outer islands. There, the fauna, as a whole, is closely allied to that of southern Greenland, and is remarkably free from the "boreal" forms ranging throughout British America. Indeed the insects and mollusks are in many cases identical with those of Greenland, as are the climatic,* topographic, and general geological features of the coast. Did the mountains of Labrador rise above the snow line, where now they just reach its lower limits, and were the rain fall slightly greater, glaciers would undoubtedly exist, running down the fiords into the sea, as they do north of Hudson's Strait, and we should perhaps have a nearly perfect correspondence between the Atlantic slope of northern Labrador and that portion of Greenland lying between the 60th and 70th parallels of latitude.

On the outer islands, lining the coast for nearly forty or fifty miles deep, in the vicinity of Hopedale, the birds,

* The mean annual temperature of Hopedale in lat. 55° 35′ "is certainly not higher than 26° Fahr." Ball's Notes of a Naturalist in South America, p. 273.

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insects, land shells and the vegetation, present an almost purely circumpolar character. Thus certain butterflies and moths first discovered in high latitutes are very abundant about Hopedale and southward, also occuring on the alpine summits of the White mountains and of the Rocky mountains, and certain of them even frequenting the Alps of Switzerland, the mountains of Scandinavia and the summits of the Altai mountains in northeastern Asia.

It is this mingled circumpolar and boreal fauna which composed that assemblage of life-forms, which peopled New England and the extreme northern states, as well as Canada, during the glacial period, and which as the ice waned, migrating northward, was gradually driven towards the north pole, though still lingering on the alpine summits, and on the treeless barrens of Labrador. These bleak, bare tracts, including many thousand square miles of islands lining the Labrador coast, agree in their vegetation and animal life with similar tracts and islands in latitudes 70° to 80° N. This is due to the cold Labrador current, and to the immense fields of floating ice, nearly filling up the channels and friths between these islands throughout the entire short summer of six weeks, thus greatly reducing the temperature, while in November the bays and inlets freeze up solid until the following June.

Indeed the Labrador peninsula with its varied physical features affords admirable examples of the influence of the environment on animal and plant life. The complete harmony which exists between the organisms, both terrestrial and marine, and their surroundings, is evidently the result of their adaption to the arctic or the subarctic

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nature of their habitats. The peninsula stands out in the Atlantic ocean, bounded on the north by the polar sea and lands, with their floating ice, glaciers, and frozen soil. Past the Atlantic shores of the peninsula sweeps the broad, deep, and powerful Labrador or polar current, bearing on its surface through the spring and summer months, and about Hudson's Strait, in certain years, throughout the autumn, a mass of floating ice about 100,000 square miles in extent. Hence the mean annual temperature is, on the coast, especially on the promontories and islands, as low as that of southern Greenland.

In my first published remarks on the occurrence of the white bear in Labrador, where it is sometimes called the "water bear," in distinction from the black bear, which is very common on that coast, I then supposed that the polar bear was a straggler from Hudson's or Baffin's bays, rather by accident than otherwise, at rare intervals breeding so far south as Labrador. But on looking over the accounts of the early discoverers and navigators, as well as Cartwright's "Journal," I am led to materially alter my opinion and to suppose that the former limits of this creature extended even possibly as far south as Casco bay, on the coast of Maine.

Whether there are any notices of or references to the white bear in the records and sagas of the Norsemen who visited the coast of Newfoundland and Nova Scotia, we are unable to say. White bears were, however, seen by the first English navigator who discovered our shores, the intrepid Venetian, John Cabot, then sailing under an English flag. The following reference to white bears appears in an extract from an inscription on the map of Sebastian Cabot in Hakluyt's Voyages (iii. 27):

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"In the yeere of our Lord 1497 Iohn Cabot, a Venetian, and his sonne Sebastian (with an English fleet set out from Bristoll) discouered that which no man before that time had attempted, on the 24th of Iune, about five of the clock early in the morning. This land he called Prima vista, that is to say, First seene, because as I suppose it was that point whereof they had the first sight from sea. That Island which lieth out before the land, he called the island of S. Iohn vpon this occasion, as I thinke, because it was discouered vpon the day of Iohn the Baptist. The inhabitants of this Island vse to weare beast skinnes, and have them in as great estimation as we have our finest garments. In their warres they vse bowes, arrowes, pikes, darts, wooden clubs and slings. The soil is barren in some places, and yieldeth litle fruit, but it is full of white beares, and stagges far greater than ours."

This account shows quite conclusively that John Cabot's Prima Vista was some point of land in eastern or northern Newfoundland. The eminent geographer, Dr. J. G. Kohl, in his History of the Discovery of Maine, seems fully persuaded that the landfall of John Cabot was Labrador. But if the inscription and map are genuine, the description of the inhabitants of the island, both men and beasts, would better apply to those of the eastern or southern Newfoundland. The human beings were more probably red Indians than Eskimo. On the Labrador coast the soil is "barren" in all places, while the "stagges far greater than ours" may have been the moose, which does not inhabit the Labrador coast. Whether the "white beares" were the polar bears or a pale variety of the barren-ground bear of Sir John Richard-

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son is somewhat uncertain. We should have unhesitatingly referred the creature to the polar bear, were it not that in Parmenius' account of Newfoundland, published in 1583, it is said: "Bears also appear about the fishers' stages of the countrey, and are sometimes killed, but they seeme to be white, as I coniectured by their skinnes, and somewhat lesse then ours." (Hakluyt.)

The next explorer of this coast was Cortereal who, in 1500, landed on the Newfoundland coast, at or probably near Cape Race. In an old Portuguese map of about the year 1520 is a long Latin inscription, thus translated by Kohl, a part of which we copy: "This country was first discovered by Gaspar Cortereal, a Portuguese, and he brought from there wild and barbarous men and white bears. There are to be found in it plenty of animals, birds and fish." The land from which Cortereal brought the white bears was evidently the same as that in which he kidnapped fifty-seven of the aborigines. These were Indians and not Eskimo, and must have been the inhabitants either of Newfoundland or of Nova Scotia, for a person who saw them in the streets of Lisbon described them "as tall, well-built, and admirably fit for labor." That, however, they were the aborigines of Newfoundland, perhaps Bethuks, seems proved by the fact that a number of white bears were also captured and sent to Spain with them. From these facts it seems reasonable to infer that the white or polar bear was a resident on the eastern coast of Newfoundland.

The next navigator to explore these seas was Jacques Cartier, who arrived May 10th, 1534, on the eastern coast of Newfoundland. To this observing seaman we owe our first accounts of the great auk or "penguin" on

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the Island of Birds, now Funk or Fogo Island, on the northeastern coast of Newfoundland; also of the Bird rocks of the Gulf of St. Lawrence.

While harboring at what is now Funk Island, Cartier, after describing the great auks, tells us that he saw a white bear. In his own language, done into quaint English by Hakluyt: "And albeit the sayd Island be 14 leagues from the maineland, notwithstanding beares come swimming thither to eat of the sayd birds: and our men found one there as great as any cow, and as white as any swan, who in their presence leapt into the sea, and upon Whitsun-monday (following our voyage towards the land) we met her by the way, swimming toward land as swiftly as we could saile. So soone as we saw her, we pursued her with our boats, and by maine strength tooke her, whose flesh was as goode to be eaten as the flesh of a calfe two yeres olde."

From this graphic and circumstantial account we feel sure that this was the great white or polar bear (*Ursus maritimus*); that it reached its full size, was not uncommon on the mainland (John Cabot says the land was "full" of them), and that it bred there, as those mentioned by Parmenius in 1583 were probably young ones.

The white bear is still occasionally seen on this coast, as Rev. Mr. Harvey states:* "The seal hunters occasionally encounter the white or polar bear on the ice off the coast, and sometimes it has been known to land."

Now, if in these early times of Cabot and Cartier the eastern coast of Newfoundland was the habitat and breeding place of the polar bear, it is not unlikely that

* Hatton and Harvey's Newfoundland, Boston, 1883, p. 193.

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it occasionally might have visited, as we know the walrus did, the coast of Nova Scotia and of Maine.

Our supposition is based on the following facts: In an ancient map of "New France," by the Italian Jacomo di Gastaldi, in about the year 1550, republished by Kohl, and which we present, though of reduced size, what we should consider as veritable white bears are depicted as swimming in the ocean far from the coast of what must have been Nova Scotia, and near to but west of Sable Island or "Isola della rena." In the map the bears are placed to the southward of "Terra de Nvrvmbega," which evidently comprised Nova Scotia and Eastern Maine. Sable Island is an enlarged portion of a broad band, intended to represent the banks of Newfoundland and La Have.

That the animals represented are bears admits of little doubt; of the four figures the lowermost one is a seal; it is drawn without ears, while the three other figures have large, drooping ears, like those of a bear. At any rate, if the locality was put in at haphazard by the map-drawer, why should white bears be also represented, as they seem to be in the ocean off Isola de Demoni. The figures of the black bear, as well as of the rabbit and of the aborigines were all drawn, and it seems not unreasonable to infer that white bears were actually seen and reported to the south and west of Newfoundland.

That the white bear may have visited the coast of Maine, near Portland, is further proved by the probable discovery by Prof. E. S. Morse of a white bear's tooth in the shell heaps of Casco Bay.

Speaking of the bones of the bears found in a shell heap on Goose Island, Casco Bay, Maine, the late Pro-

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fessor Wyman remarked in the AMERICAN NATURALIST, 1,575, January, 1868:

"The bones of the *bear* though much less numerous, were similarly broken up, and in two instances had been carbonized by contact with the fire. Among the specimens collected by Mr. Morse in his first visit to Crouch's



cove was the last molar from the lower jaw. The crown was somewhat worn, but the ridges were not all effaced; it was of small size, measuring 0.55 inch in length and and 0.46 in breadth. The average size of eight specimens of the same molar in the black bear was: Length, 0.60 inch; breadth, 0.47, while that of two specimens from the polar bear was, length, 0.54 inch; breadth, 0.45. The tooth from the shell heaps, therefore, as re-

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gards size, more closely resembles the last-mentioned species, as it does also in the shape of the crown—but it must be unsafe from a single specimen of the molar in question to attempt to identify them. The former existence of the polar bear on the coast of Maine is rendered quite probable by the fact that the tusk of a walrus has actually been found at Gardiner."

That the white bear formerly was an inhabitant of Newfoundland seems probable from the facts we have brought together, and it is to be hoped that the antiquarians and naturalists of Newfoundland will investigate the shell heaps, should such be found, of that island for further facts bearing on this subject.

We will now turn our attention to the former presence of the white bear on the Labrador coast, where the settlers still call it the "water bear." We find only in Cartwright's Journal reference to this creature, but this is sufficient to show that it bred on and permanently inhabited this coast from Belle Isle, or Chateau Bay, northward. A white bear was killed in 1769 at Pitt's harbor, Chateau Bay. There is a "White Bear Sound" on Cartwright's map just north of Cape Charles, near Battle Island. Cartwright's house was to the northward of Cape Charles, in an arm of Sandwich Bay. In 1770 Cartwright saw the track of two large white bears, and the Eskimo killed one the same year near his house. In April, 1772, the tracks of three white bears were seen. In April, 1776, a white bear and cubs were seen near Huntington Island, and in the following May another was observed. White bears were also seen up the rivers leading into Sandwich Bay, and on pp. 410–11 Cartwright describes the habits of the white bear in Labrador, stating that the young

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are born in March, the parent bringing forth usually one at a time, sometimes two.

While on the coast of Labrador in the summers of 1860 and 1864, we gathered what facts we could as to the occurrence of this animal, publishing them in the Proceedings of the Boston Society of Natural History (Vol. x, 1866, 270), from which we take the following extract:

"At Square island, a locality situated between Belle Isle and Domino Harbor, two cubs were captured and taken to St. Johns, Newfoundland. At Domino Harbor the skin of a bear killed during the preceding spring (1863) was obtained by one of our party. An intelligent hunter told me that the white bear was not unfrequently seen at Stag Bay, near Roger's Harbor, which is situated a little more than fifty miles south of Hopedale. One was killed there during the preceding winter (1863), and in the autumn their tracks were abundant. They were very shy, and could not be seen in the daytime. Further south they are much rarer. The last polar bear said to have been seen in the Strait of Belle Isle was shot fifteen years ago (1849), at the settlement of Salmon Bay."

While the entire peninsula was during the glacial period mantled in ice, and as cold, or nearly so, as Greenland is at present, the more exposed parts of the coast north of Belle Isle are still arctic, or at least subarctic. On the other hand the main land, for the most part consisting of Laurentian gneiss and schists, has probably from Archæan times been dry land, forming an important portion of the continental nucleus of North America. Its scanty soil is now over a large proportion of its surface probably frozen throughout the year; the

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Barren Grounds extend as far south as perhaps lat. 58°, and spread still southward on the higher elevated portions of the plateau, which are bare of trees, so that the northern third of the peninsula is practically arctic, the animal and plant life being essentially arctic. But southward, including the sheltered valleys of the northern or Atlantic coast and of the elevated interior, with the St. Lawrence region, the climatic features and flora and fauna are like those of the western and southern shores of Hudson's Bay and the northern shores of the St. Lawrence. It thus forms a portion of the Boreal or Canadian Province of temperate North America.

It will thus be seen that the conditions of existence, and the adjustment of the plants and animals to their habitats in Labrador, are those primarily depending on the temperature both of the ocean and of the air; and the more we know of the distribution of life in this region, the more delicate appears to be the balance maintained between the organisms and their environment. This is also seen in the relative distribution of the Indians and Eskimos. The former inhabit the boreal, wooded portions; the latter the arctic, bare, treeless, arctic portions of the coast and of the Barren Grounds, when the latter shade into the barren east and west coast of the northern extremity of the peninsula.

The best example of a purely arctic animal which still breeds on the coast is the white bear. It is an interesting fact that at Fort George, Hudson's Bay, both the black and white bear are known to breed. The white bear mates about the middle of April, and "the young, from one to three in number, are born in holes under rocks lined with brush, grass, and moss, to-

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wards the end of October. At time of birth they are the size of a large rat, white in color, helpless, and with closed eyes. They are suckled for five months, the male assisting in rearing them." *

With the white bear is still associated the walrus, which was formerly as abundant on this coast, and in the Gulf of St. Lawrence on the Magdalen Islands and certain parts of Nova Scotia, as it now is in the polar regions.

The Britons and Basques, as well as the English, went to the Gulf of St. Lawrence after morses, during the years 1591–93. How abundant they were is stated in "A relation of the first voyage and discoverie of the Isle Ramea, made by for Monsieur de La Court Pre Rauillon, and Grand Pre, with the ship called the Bonaventure, to kill and make Traine oil of the beast called the Morses with great teeth, which we have perfourmed by Gods helpe this yeere 1591." (Hakluyt iii. 235.)

"The coast stretcheth three leagues to the west from Lisle Blanch or the white Isle, vnto the entrance of a riuer, where we slewe and killed to the number of fifteene hundred Morses or Sea oxen, accounting small and great, when at full sea you may come on shoare with boates, and within are two or three fathoms water."

"The 14 [June] we came to the two Islands of Birds, some 23 leagues frō Menego; where there were such abundance of Birds, as is almost incredible to report. And vpon the lesse of these Islands of Birds, we saw great store of Morsses or sea Oxen, which were a sleepe

* Miles Spencer, Annual Report of the Geological and Natural History Survey of Canada. New Series, iii. Part 2, 1878-88, p. 76.

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vpon the rockes; but when we approched nere vnto them with our boate, they cast themselues into the sea and persued vs with such furie as that we were glad to flee from them."

"The three Islands of birds are sandy red, but with the multitude of birds vpon them they looke white. The birds sit there as thicke as stones lie in a paued street. The greatest of the Islands is about a mile in compasse. The second is a little lesse. The third is a very little one, like a small rocke. At the second of these three lay on the shore in the Sunshine about thirty or forty sea-oxen or morses; which when our boat came nere them, presently made into the sea, and swam after the boat." (The voyage of Mr. Charles Leigh and diuers others to Cape Briton and the Isle of Ramea, 1597. Hakluyt iii. 242.)

Parkman* also tells us that the year after the battle of Ivry, St. Malo sent out a fleet of small craft in quest of this new prize.

Hind, speaking, of Seven Islands Bay, in his work on Labrador, says: "In the spring and at the approach of winter it is visited by myriads of ducks, geese, and swans; it was formerly a favorite haunt of the walrus, which, although not now seen even in the Gulf itself, was once common as far up the great river St. Lawrence, as the mouth of Saugenay, and from this animal the 'Pointe aux Vâches,' about a mile below Tadousac, takes its name. Not improbably the 'fishes like horses' which the Indians described as frequenting the Chi-schedec, and which Lescarbot calls hippopotami, were these large animals."

* Pioneers of France in the New World, p. 209.

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The bones of the walrus were in late years still to be found on the shores of the Magdalen Islands, its former great abundance there having been commented on by Cartier and Charlevoix. According to tradition, it also inhabited some of the harbors of Cape Breton; and I have been informed by a Maine fisherman, that on an islet near Cape Sable, Nova Scotia, the bones of an enormous seal-like creature are to be found in the sand near the shore, fifteen to twenty feet above the sea. The last one seen or heard of in the Gulf, so far as I could ascertain, was killed at St. Augustine, Labrador, about the year 1840. One was seen at Square Island in 1849, and two shortly before that, and another was killed at the same place about the year 1855. In 1864 I saw the head of a young walrus, which was found floating dead in the drift ice north of Belle Isle, having been killed apparently by a harpoon. Mr. Stearns states that two were shot in 1880 and 1881 at Fox Harbor, St. Lewis Sound, off shore a little way.

The following lists, with the remarks appended, will give in a methodical way what little is really known of the zoology of the Labrador coast, beginning with the animals of the lowest classes and ascending to the highest. The lists are printed rather for the benefit of the scientific than the general reader. It may be mentioned that a few species of sponges were collected, but not identified.

CŒLENTERATES. (Polyps, Hydroids, etc.)

Metridium marginatum Edw. & H. From Indian Harbor southward, below low-tide.

Urticina crassicornis Ehr. From Square Island southward; 1–10 f.

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Edwardsia sipunculoides Stimp. Henley Harbor; 4 f.

Hydractinia polyclina Agass. Salmon Bay, Strait of Belle Isle.

Coryne mirabilis Agass. Belles Amours.

Clava multicornis Pallas. Salmon Bay.

Thuiaria thuja Fleming. Mingan Islands, Labrador.

Halecium halecinum Johnst. Caribou Island in eight fathoms, gravelly bottom, where its branches supported the nests of *Cerapus rubricornis* Stimps. Frequent in thirty fathoms; Château Bay, on a sandy bottom.

Halecium muricatum Johnst. Off Caribou Island, in from thirty to fifty fathoms. Square Island in thirty fathoms.

Cotulina polyzonias (Linn.). Caribou Island.

Cotulina tricuspidata (Alder). Strait of Belle Isle in forty fathoms upon *Diphasia rosacea.*

Amphitrocha rugosa (Linn.). Square Island, 30 f.

Sertularia filicula Ell. and Sol.

Sertularia falcata Linn. Mingan Islands, Gulf of St. Lawrence.

Sertularia argentea Ell. and Sol. Caribou Island.

Sertularia cupressina Linn.

Sertularia abietina Linn. Mingan Islands, Gulf of St. Lawrence, and Labrador.

Diphasia rosacea (Linn.). Strait of Belle Isle, 50 f.

Dynamena pumila Lamx. Strait of Belle Isle, between tide-marks.

Lafœa dumosa (Johnst.). Cateau Harbor, Long Island; 15 f.

Laomedea amphora Agass. Square Island.

Clytia volubilis (Alder.). Henley Harbor, 20 to 30 f.

Oceania languida A. Agass. Caribou Island, 8 f.

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Campanularia verticillata Johnst. Henley Harbor, 20 f.

Lucernaria quadricornis Müll. Caribou Island, 10 f.

Manania auricula (Fabr.).

Trachynema digitale A. Agass. Strawberry Harbor, 15 f.

Cyanea arctica Pér. et Lesson. Strait of Belle Isle.

Aurelia flavidula Pér. et Lesson. Strait of Belle Isle, and in retired bays.

Idyia roseola Agass. Cape Webuc (Harrison) to Salmon Bay in the Strait of Belle Isle.

Pleurobrachia rhododactyla Agass. Little Mecatina Island.

Mertensia ovum Mörch.

Echinoderms.

Astrophyton eucnemis Müller and Troschel. Strait of Belle Isle, 18 to 80 f.

Ophiacantha spinulosa Müll. and Trosch. Strait of Belle Isle, 40 f.

Amphiura sundevalli M. and T. Cateau Bay, Long Island, 15 f.

Ophiopholis aculeata Müller. Whole coast 2–50 f.

Ophioglypha Sarsii (Lütken). Cateau Bay, Long Island, 15 f.

Ophioglypha nodosa Lyman. Salmon Bay to Square Island, low-water to 30 f.

Ophioglypha robusta (Ayres). L'Anse-au-Loup to Square Island, 2–10 f. (Stearns).

Crossaster papposa (Linn.). Salmon Bay, Square Island, 15–30 f.

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Solaster endeca (Linn.) Forbes. Long Island, Cateau Bay, 15 f.

Cribella sanguinolenta (Müll.). Salmon Bay, Strait of Belle Isle, 15 f., Square Island (Stearns).

Asterias grœnlandicus Steenstr. Caribou Island and Square Island, 15 f.

Asterias vulgaris Stimps. Whole coast.

Asterias polaris (Müll et Trosch.). Caribou Island, Square Island and Hopedale. Large specimens, measuring 20 inches across, frequently occurred in pools at low-water mark. The color in life was a light greenish hue, mottled with reddish brown.

Lepasterias littoralis (Stimps.). Near Square Island, 1–5 f. (Stearns).

Strongylocentrotus dröbachiensis Agass. Whole coast.

Echinarachnius parma Gray. Strait of Belle Isle.

Lophothuria Fabricii Verrill. Esquimaux Bay, 15 f.

Pentacta calcigera Stimps. Strait of Belle Isle.

Pentacta frondosa Jaeger. Strait of Belle Isle.

Chirodota læve Grube. Whole coast.

Eupyrgus scaber Lütken. Salmon Bay, 10 f., to Long Island, 15 f.

Myriotrochus Rinkii Steenstr. Sandwich Bay to Domino, 7–30 f.

Polyzoans.

Tubulipora serpens (Linn.). Square Island, 30 f.; Henley Harbor.

Tubulipora patina Johnst. Domino Harbor, 7 f.

Tubulipora divisa Stimps. Henley Harbor, 4 f.

Tubulipora hispida Johnst. Strait of Belle Isle, 50 f.

Tubulipora palmata Wood. Strait of Belle Isle, 50 f.

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Tubulipora expansa (Packard). Strait of Belle Isle.

Tubulipora atlantica Johnst. Strait of Belle Isle, 50 f. ; Square Island, 30 f.

Discoporella verrucaria (Fabr.). Strait of Belle Isle, 50 f.

Hippothoa catenularic Jameson.

Hippothoa borealis D'Orb. Strait of Belle Isle and Cateau Harbor.

Hippothoa expansa Dawson. Strait of Belle Isle.

Lepralia annulata O. Fabr. Strait of Belle Isle; also in Cateau Harbor, Long Island, 15 f.

Lepralia ciliata Johnst. Whole coast.

Lepralia (n. sp.). Allied to *L. trispinosa* Johnst.; very abundant.

Lepralia pertusa Thomps. Cateau Harbor, 15 f.

Lepralia producta Pack.

Lepralia trispinosa Johnst.

Lepralia Belli Dawson. Strait of Belle Isle.

Lepralia labiata Stimps.

Lepralia lineata Hassell.

Smittia globifera (Pack.).

Electra pilosa (Linn.).

Membranipora lineata (Linn.). Strait of Belle Isle, 10–50 f.

Membranipora unicornis var. *americana* D'Orb.

Membranipora solida Pack.

Beania admiranda Pack.

Crisiae burnea (Linn.). Hopedale, 10 f.; Henley Harbor, 4 f.

Bugulopsis Peachii (Busk.).

Cellularia ternata (Solander). Strait of Belle Isle, 50 f.

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Scrupocellaria americana Pack. Strait of Belle Isle, 50 f.; Belles Amours, 8 f.; Square Island, 10–30 f.

Acamarchis plumosa Busk. Thomas Bay, 15 f.

Caberea Hookeri Busk.

Flustra borealis (Pack.). Strait of Belle Isle, 50 f.

Flustra truncata Linn.

F. membranacea Linn.

Flustra papyrea Pall. *digitata* (Pack.). Château Bay, 30 f.

Bugula murrayana Busk. Whole coast.

Bugula murrayana var. *fruticosa* Pack.

Cellepora pumicosa Ellis.

Celleporaria surcularis Pack. Can. Nat. p. 410.

Eschara lobata Lamx.? Whole coast, 10–50 f.

E. elegantula D'Orb. Strait of Belle Isle, 50 f.

Porella elegantula D'Orb. var. *papposa* (Pack.). Château Bay.

Leieschara subgracilis (D'Orb.) (*Myriozoum subgracile* D'Orb.). Strait of Belle Isle, 50 f.

BRACHIOPODS.

Hypothyris psittacea King.

Frequent on hard and sandy bottoms along the whole coast in from eight to fifty fathoms.

MOLLUSCS. *

LAMELLIBRANCHIATA.

Anomia ephippium Linn. Caribou Island, 8 f.; Square Island, 30 f.

Anomia aculeata Gmelin. Strait of Belle Isle, 10–50 f.

* This list has been perfected by incorporating the species found by Mr. W. A. Stearns, and recorded by Miss Katharine J. Bush in her "Catalogue of Mollusca," etc., of Labrador.

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Astarte Banksii Leach. Whole coast in deep water.

Astarte compressa (Linn.). Abundant on the whole coast in from 10 to 50 f.

Astarte arctica (Gray). Henley Harbor to Square Island, 2–15 f. (Stearns).

Astarte elliptica (Brown). Henley Harbor, 5–15 f. (Stearns.)

Astarte striata Leach. Hopedale, 10 f.

Cardium ciliatum Fabr. Square Island, 30 f; Salmon Bay, 10 f.

Cardium Hayesii Stimps. Whole coast, 10–30 f.

Pecten tenuicostatus Mighl. Strait of Belle Isle.

Pecten islandicus Müll. Whole coast, 10–50 f.

Limatula sulculus Leach. Several were dredged in 15–50 f.

Nucula tenuis Turton. Common on the whole coast.

Nucula expansa Reeve. Château Bay, 50 f.

Yoldia myalis (Couth). L'Anse-au-Loup, 15 f.

Yoldia sapotilla Stimps. Strait of Belle Isle, 10–15 f.

Leda buccata Stimps. Long Island, 15 f.; Henley Harbor, 20 f.

Leda Jacksoni Gould. Henley Harbor, 10–15 f. (Stearns.)

Leda minuta (Fabr.). Whole coast, 15–50 f.

Crenella glandula (Totten). Caribou Island, 5 f.; Square Island, 30 f.

Modiolaria corrugata Stimps. Strait of Belle Isle, 50 f.

Modiolaria nigra (Gray). L'Anse-au-Loup, 10 f. (Stearns.)

Modiolaria discors (Linn.). Near Square Island, 1–4 f. (Stearns.)

Modiolaria lævigata Gray.

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Modiolaria faba (Fabr.). Henley Harbor, 4 f.

Modiolaria discrepans Müll. Strait of Belle Isle; Square Island, 30 f.

Mytilus modiolus Linn. Strait of Belle Isle.

Mytilus edulis Linn. Whole coast.

Alasmodonta arcuata Barnes? I was told that a fresh-water mussel was common in Salmon River.

Pisidium Steenbuchii (Möll.). Square Island and Strawberry Harbor.

Cryptodon obesus Verrill. Strait of Belle Isle, 50 f., and whole coast.

Axinopsis orbiculata Sars. Henley Harbor, 10–15 f. (Stearns.)

Venericardia borealis (Conr.). Strait of Belle Isle, 50 f.; Long Island, 15 f.; Château Bay, 50 f.

Cardium pinnulatum Conr. It did not occur north of the Strait of Belle Isle.

Serripes grœnlandicus Beck. Whole coast, 10–50 f.

Gemma Totteni Stimps. Indian Harbor, low-water.

Tapes fluctuosa Sowb. Henley Harbor, 20 f.; Square Island, 30 f.

Mactra solidissima Chemn. Mouth of Esquimaux River; Strait of Belle Isle.

Mactra polynema Stimps. Strait of Belle Isle.

Mesodesma Jauresii Joannis. Strait of Belle Isle.

Macoma fragilis (Fabr. *fusca* Gould). Whole coast.

Macoma sabulosa Stimps. Whole coast.

Solen ensis Linn. Strait of Belle Isle.

Thracia Conradi Couth. Strait of Belle Isle.

Thracia myopsis Beck. Salmon Bay, 10 f.; Long Island, 15 f.

Periploma papyracea (Say.). Château Bay, 15 f.

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Kennerlia glacialis (Leach). Strait of Belle Isle, 15 f.; Henley Harbor, 20 f.; Square Island, 30 f.

Lyonsia arenosa (Möll.). Strait of Belle Isle, 15 f.; Long Island, 15 f.

Cyrtodaria siliqua Daudin. Strait of Belle Isle, 15–50 f.

Mya truncata Linn. Strait of Belle Isle, 50 f.; Square Island, 30 f.

Mya arenaria Linn. Whole coast.

Saxicava rugosa Linn. Whole coast, 10–50 f.

Gasteropods.

Clione limacina Phipps. Whole coast.

Limacina helicina Phipps. Off Cape Harrison.

Proctoporia ? sp. Strait of Belle Isle, 50 f.

Eolis sp. Henley Harbor, 4 f.

Dendronotus arborescens Fabr. Henley Harbor.

Cylichna alba Lovén. Caribou Island, 10–15 f.; Château Bay, 50 f.; Sloop Harbor, 7 f.

Bulla pertenuis Migh. Belles Amours, 8 f.

Bulla occulta Migh.

Coryphella diversa Couth. L'Anse-au-Loup. (Stearns.)

Tonicella marmorea (Fabr.). Strait of Belle Isle, low-water to 50 f., and northward.

Trachydermon album (Linn.). Strait of Belle Isle, 50 f.

T. rubrum. (Linn.). Whole coast north to Square Island. (Stearns.)

Acmæa testudinalis Müll. Low-water to 15 f.; whole coast.

Acmæa rubella (Fabr.). Square Island, 30 f.; Strawberry Harbor, 20 f.

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Lepeta cæca (Müll.). Henley Harbor. (Stearns.)

Puncturella noachina (Linn.). Strait of Belle Isle, 10–50 f.; Square Island, 30 f.

Scissurella crispata Flem. Strait of Belle Isle.

Adeorbis costulata Stimps. Strait of Belle Isle.

Machæroplax varicosa (Mighels). Square Island, 10–30 f.; Strait of Belle Isle, 50 f.

Machæroplax obscura (Couth.). L'Anse-au-Loup, 15 f.

Margarita cinerea Gould. Caribou Island, 7 f.; Long Island, 15 f.; Square Island, 30 f.

Margarita argentata Gould. Near Square Island. (Stearns.)

Margarita grœnlandica (Gm.). Strait of Belle Isle, 15–20 f.

Margarita helicina Möll. Strait of Belle Isle.

Margarita campanulata Morse. Strait of Belle Isle.

Littorinella minuta (Totten). Strait of Belle Isle; Fox Harbor. (Stearns.)

Cingula castanea Möll. Strait of Belle Isle; near Square Island, 1–4 f.

Velutina haliotoides Müll. Whole coast.

Lacuna vincta Turt. Square Island, 30 f.

Littorina vestita Gould. Not uncommon along the whole coast.

Littorina palliata Gould. Strait of Belle Isle, with varieties as in Maine.

Littorina littorea (Linn.). (Stearns.)

Scalaria grœnlandica Perry.

Turritella erosa Couth. Château Bay, Long Island, 15 f.

Turritella reticulata Mighl. Salmon Bay, 15 f.; Château Bay, 15 f.; Square Island, 30 f.; Hopedale, 10 f.

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Turritellopsis acicula (Stimps.). Strait of Belle Isle, 50 f.

Aporrhais occidentalis Beck. Salmon Bay to Hopedale, 6–50 f.

Menestho albula Möll. Strait of Belle Isle, 2–15 f.

Velutina lævigata (Linn.). Henley Harbor, 3–8 f.; Square Island, 1–4 f. (Stearns.)

Lamellaria perspicua Lovén. 15 f.

Natica heros Say. Salmon Bay, Strait of Belle Isle.

Natica clausa Sowb. Whole coast, 15 f.

Lunatia grœnlandica (Möll.). Château Bay, 15 f.

Bela scalaris (Möll.). Square Island, 15–30 f.; Dumplin Harbor, 4 f.

Bela rosea Sars. Forteau Bay, 20 f. (Stearns.)

Bela mitrula Lovén. With the preceding. (Stearns.)

Bela incisula Verrill. Forteau Bay to Square Island, 2–20 f. (Stearns.)

Bela nobilis (Möller). Whole Coast.

Bela woodiana Möll. Whole Coast.

Bela exarata (Möll.). Whole coast.

Bela decussata (Couth.). Salmon Bay, 10–15 f.; Square Island, 30 f.

Bela pleurotomaria (Couth.). Square Island, 30 f.; Sandwich Bay, 4 f.

Bela pyramidalis Stimps. Square Island, 30 f.

Bela cancellata Mighl. Square Island, 30 f.

Bela violacea Stimps. Square Island, 30 f.

Bela borealis (Rve.). Square Island, 30 f.; Sandwich Bay 4 f.

Buccinum donovani Gray. Henley Harbor, low-water to 15 f. (Stearns.)

Buccinum totteni Stimps. Henley Harbor, 8–15 f. (Stearns.)

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Buccinum ciliatum (Fabr.). Henley Harbor, 3–8 f. (Stearns.)

Buccinum undatum Linn. Whole coast.

Buccinum tenue Gray. Strait of Belle Isle, 50 f.

Tritonofusus cretaceus (Reeve). Strait of Belle Isle to Square Island, 7–30 f.

Sipho lividus (Mörch). Henley Harbor to Square Island, 1–8 f. (Stearns.)

Fusus syrtensis Pack. Square Island, 30 f.

Fusus tornatus Gould. Strait of Belle Isle, 50 f.

Trichotropis borealis Brod. and Sowb. Whole coast, 10–50 f.

Admete couthouyi (Jay). Strait of Belle Isle, 50 f. (Square Island, 1–4 f. Stearns.)

Trophon clathratus (Linn.). L'Anse-au-Loup, 10–15 f.; Henley Harbor, 3–15 f.

Trophon scalariforme Stimps. Strait of Belle Isle, 50 f.; Château Bay, 50 f.; Henley Harbor, 20 f.

Astyris rosacea (Gould). L'Anse-au-Loup, 8 f.; Henley Harbor, 3–8 f. (Stearns.)

Ischmia (*Pupa*) *Hoppii* Beck. Strawberry Harbor.

Zoögenetes harpa (Say). Caribou Island.

Conulus (*Helix*) *Fabricii* Beck et Möller. Strawberry Harbor.

Hyalina electrina (Say). Belles Amours.

Vitrina angelicæ Beck et Möller. Strawberry Harbor.

Limax agrestis Linn. Strawberry Harbor and at Square Island.

CEPHALOPODS.

Ommastrephes illecebrosus Les. L'Anse-au-Loup, 15 f.; and Fox Harbor. (Stearns.)

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Worms.

Syrinx ? sp. Salmon Bay, 8 f.

Phascolion strombi Theel. (*Phascolosoma hamulatum* Pack.) Salmon bay, 8 f.

Gordius lacustris Fabr.? Fauna Grönl. Caribou Is.

Pontobdella sp. Henley Harbor, 4 f.

Pontobdella ? livida Pack. Belles Amours, 8 f.

Cerebratulus (*Meckelia*) *olivacea* Rathke. Salmon Bay 10 f., to Henley Harbor, 20 f.

Cerebratulus cylindricus Pack. Belles Amours, 8 f.

Lumbricus terrestris Linn.? Square Is. and Hopedale.

Spirorbis vitreus (Fabr.). Strait of Belle Isle, 40–50 f.; Strawberry Harbor, 15 f.

Spirorbis sinistrorsus Montagu. Henley Harbor, 4 f.

Spirorbis lucidus Mörch. (*Spirorbis porrectus* Müll.). Whole coast, 11–30 f.

Spirorbis cancellatus (Fabr.). Strait of Belle Isle, 40 f.

Spirorbis granulatus (Müll.). Whole coast, 10–40 f.

Spirorbis spirillum (Linn.). Whole coast.

Vermilia serrula Stimps. Strait of Belle Isle, 50 f.

Amphitrite cirrata Müll. Cateau Harbor; Caribou Island, Strait of Belle Isle, 8 f.

Amphitrite ? sp.

Ampharete Grubei Malmgren. Henley Harbor, 4 f.

Pectinaria granulata (Linn.). *Cistenides granulatus* Linn. non Johnst. Whole coast, low-water to 50 f.

Praxilla Mülleri Malmg. Château Bay, 30-40 f.

Nicomache lumbricalis Malmg. Salmon Bay, 8 f.

Spiochætopterus typicus Sars. Château Bay, 30–40 f.

Arenicola marina (Linn.). (*Arenicola piscatorum* Lamk.)

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Trophonia aspera (Stimps.). (*Siphonostomum asperum* Stimps.) Salmon Bay, 8 f.

Trophonia plumosa (Müll.). Salmon Bay, 10 f.

Cirratulus cirratus (Fabr.). Strait of Belle Isle.

Heteronereis arctica Oersted? Strait of Belle Isle.

Nephthys longisetosa Oersted. Belles Amours, 5 f.

Nephthys cæca Oersted. Whole coast, 5–30 f.

Eteone cylindrica Oersted. Belles Amours, 5 f.

Phyllodoce grœnlandica Oersted. Salmon Bay, 8 f.; Square Island, 15–20 f.

Nothria conchylega Malmgren. Salmon Bay, 15 f.; Château Bay, 30 f.; Cateau Harbor, 15 f.

Nereis pelagica (Linn.). Whole coast, 10–30 f.

Nereis denticulata Stimps. Salmon Bay, between tide-marks.

Pholoë minuta Oersted. Belles Amours, 8 f.

Harmothoë imbricata Linn. Whole coast, 4–15 f.

Lepidonotus squamatus (Linn.). Whole coast, low-water to 20 f.

CRUSTACEANS.*

Nymphon grossipes Fabr. Salmon Bay and Square Island, 15–30 f.

Coronula diadema (Linn.). Taken quite frequently from the skin of whales caught in the Gulf of St. Lawrence.

Balanus crenatus Brug. Whole coast.

Balanus balanoides Linn. Whole Coast.

Balanus porcatus Da Costa. Whole coast.

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*Compare also "List by Prof. S. J. Smith of Crustacea from Port Burwell, collected by Dr. R. Bell in 1884." Report of Progress of Geological and Natural History Survey and Museum of Canada, 1882–83–84. Appendix iv. 57 DD. (Port Burwell is an inlet on the Ungava side of Cape Chidley).

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Lernæa branchialis Linn.

Daphnia sp. Found abundantly in all the fresh-water pools.

Cypridina excisa Stimps.

Branchinecta paludosa (Müll.). Found abundantly at "Indian Tickle," on the north shore of Invuctoke Inlet, in a pool of fresh water.

Nebalia bipes Fabr. Henley Harbor, 4–8 f.

Bopyrus mysidum Pack.

Æga sp. One specimen was taken from the under side of a cod in the Strait of Belle Isle.

Tanais filum Stimps. Caribou Island, 8 f.

Praniza cerina Stimps. Château Bay, Long Island, 15 f.

Jæra nivalis Kroyer. Indian Harbor, Sandwich Bay.

Idotæa marmorata Pack. Sloop Harbor, Kyuetar buck Bay, 7 f.

Caprella septentrionalis Kroyer. Whole coast, 4–30 f.

Hyperia medusarum Bate. Found with numerous young in the stomach-cavity of *Cyanea arctica*, at Dom ino Harbor.

Dulichia porrecta (*fide* Boeck).

Cerapus rubriformis Stimps. Inhabits flexible tubes in *Halecium halecina*. Eight fathoms, sand, Caribou Island, Strait of Belle Isle.

Amphithoë maculata Stimps. Henley Harbor, 8 f.

Gammarus locusta (Linn.) Leach.

Gammarus dentatus Kroyer. Square Island, 15–30 f.; Strait of Belle Isle, 15 f.; Château Bay, 20–30 f.

Paramphitoë panopla Kroyer.

Calliope læviuscula Bate. Henley Harbor, 4 f.; Stag Bay, 15 f.

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Amphitonotus Edwardsii Bate. Square Island, 30 f.

Amphitonotus cataphractus Stimps. Henley Harbor, 4 f.

Atylus vulgaris Bate. Henley Harbor, 4 f.; Square Island, 15 f.; at Stag Bay, 15 f.

Atylus (*Paramphitoë*) *inermis* (Kroyer). Henley Harbor, 10–20 f.

Atylus (*Paramphitoë*) *bispinosus* Beck.

Monoculodes nubilatus Pack. Caribou Island, 8 f.; Henley Harbor, 4 f.

Ampelisca Gaimardi. Château Bay, 30 f.; Cateau Harbor, 15 f.

Ampelisca pelagica (Stimps). Château Bay, 30 f.; Stag Bay, 10 f.; Caribou Island, 8 f.; Long Island, 15 f.; Strawberry Harbor, 14 f.

Ampelisca Eschrichtii Kroyer. Caribou Island, 14 f.

Haploops tubicola Kroyer. Cateau Harbor, 15 f.

Pontoporeia femorata Kroyer. Belles Amours, Strait of Belle Isle, 5–8 f.

Anonyx ampulla (Phipps). Dumplin Harbor, Sandwich Bay, 4 f.

Anonyx lagena Kroyer. Sloop Harbor, 8 f.

Anonyx producta. 15 f., sand.

Lysianassa appendiculata Kroyer. Henley Harbor, Strait of Belle Isle, 40 f.

Alauna Goodsiri Bell. Belles Amours, 6 f.; Thomas Bay, 15 f.; Square Island, 15–30 f.; Henley Harbor, 8 f.; Cateau Bay, Long Island, 15 f.

Mysis oculata Fabr. Abundant along the whole coast. The young go in schools, and the sea-trout consume great numbers of them.

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Pandalus annulicornis Leach. Henley Harbor; Sloop Harbor, 6 f.; Hopedale, 10 f.

Hippolyte aculeata (Fabr.) Kroyer. Caribou Island, 14 f.; Square Island, 15–30 f.; Domino Harbor, 7 f.; Strait of Belle Isle, 10 f.

Hippolyte polaris (Sabine) Kroyer. Square Island, 15–30 f.; Strait of Belle Isle, 10 f.

Hippolyte Phippsii Kroyer. Domino Harbor, 7 f.

Hippolyte turgida Kroyer. Belles Amours, 10 f.

Hippolyte macilenta Kroyer. Square Island, 15–30 f.

Hippolyte Sowerbyi Leach. Square Island, 15–30 f.

Hippolyte Gaimardi M. Edwards. Common on the whole coast. Caribou Island, 15 f.; Square Island, 30 f.; Henley Harbor and Sloop Harbor, 8 f.; Hopedale, 10 f.

Hippolyte Fabricii Kroyer. Domino Harbor, 7 f.

Argis lar Owen. Square Island, 30 f.

Sabinea septemcarinata Sabine. Thomas Bay, 15 f.

Crangon boreas (Phipps). Caribou Island, 8 f.; Strait of Belle Isle, 10 f.; Square Island, 30 f.; Henley Harbor, 4–10 f.

Crangon vulgaris Fabr. Caribou Island.

Homarus americanus M. Edw. Henley Harbor; rare. This seems to be the northern limits of the lobster.

Eupagurus pubescens Stimps. Abundant on the whole coast from low-water mark to fifty fathoms. Strait of Belle Isle, 50 f.; Hopedale, 10 f.

Eupagurus Kroyeri Stimps. Found with preceding.

Hyas coarctata Leach. Henley Harbor, 30 f.

Hyas aranea (Linn.). Abundant along the whole coast, 5–50 f.

Chionœcetes opilio (Fabr.). Strait of Belle Isle, 10–50 f.; Chateau Bay, 30–50 f.

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Cancer borealis Stimps. Not uncommon at Caribou Island, Strait of Belle Isle, but it did not occur to us northward. I was informed that it was found in Hamilton Inlet, where the temperature of the water must be higher than on the coast.

LIST OF THE SPIDERS, MYRIOPODS, AND INSECTS OF LABRADOR.

A list of all the known species of terrestrial Arthropods of the Labrador coast may prove convenient as a starting-point for future investigations. Hence I have, besides enumerating the species of other groups, revised the lists of Lepidoptera—Mr. Scudder kindly contributthe list of butterflies. For changes in the names of the Tortricidæ I am indebted to Prof. C. H. Fernald's excellent catalogue of the Tortricidæ of the United States; Prof. Fernald has also revised the list of Pyralidæ.

ARACHNIDA.

The spiders which I collected at various points on the coast were sent to Prof. T. Thorell, of Upsala, for identification and description. Out of ten species collected, seven were new to science. Prof. Thorell's paper was published in the Proceedings of the Boston Society of Natural History, xvii., April 21, 1875.

Epeira patagiata (Clerck). Square Island, Strawberry Harbor.

Epeira Packardii Thor. Square Island.

Tetragnatha extensa (Linn.). Square Island.

Linyphia Emertonii Thor. Square Island, and near Dumplin Harbor.

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Clubiona frigidula Thor. Square Island.

Gnaphosa brumalis Thor. Strawberry Harbor.

Lycosa grœnlandica Thor. Strawberry Harbor.

Lycosa furcifera Thor. Square Island, and near Dumplin Harbor.

Lycosa fuscula Thor. Strawberry Harbor.

Lycosa labradorensis Thor. Strawberry Harbor and Square Island.

Xysticus labradorensis Keys. K. K. Zool. Bot. Ges. Wien., 479, 1887. Ungava Bay (Turner).

Myriopoda.

Julus sp. Square Island.

Insects.

Orthoptera.

Caloptenus. A Pezzotettix-like species, with short wings. Square Island.

Odonata.

Diplax sp., near *rubicundula.* Caribou Island. Dragon-flies were very rare on the coast, and I saw none north of the Strait of Belle Isle.

Æschna sp. Caribou Island. Perhaps another species (identified by Dr. P. R. Uhler) also occurred, and an Æschna-like form was observed at Tub Island.

Hemiptera.

Teratocoris sp.

Deltocephalus debilis Uhler. Hopedale. A few other species of Cercopidæ were seen at Caribou Island.

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Trigonotylus ruficornis Fallen. Hopedale.
Corixa sp.

Platyptera.

Pteronarcys regalis. Okkak. Hopedale.

Plectoptera.

Potamanthus marginatus Zett. This boreal European May-fly, occurring in Lapland, we have found in abundance in southern Labrador.

Perla sp. Belles Amours.

Chloroperla sp. A small greenish species was observed at Strawberry Harbor.

Trichoptera.

Desmataulius planifrons Kol. Okkak.

Limnophilus subpunctulatus Zett. This Lapland caddis-fly is the most abundant species in Labrador, and what are probably its cases are common in the pools of fresh water. Three or four other species also occurred, but have not been identified. No genuine *Neuroptera* or *Mecoptera* (Panorpidæ) occurred.

COLEOPTERA.

Lepyrus colon (Linn.). Cape Chidley (R. Bell).
Pissodes? sp, Hopedale.
Coccinella lacustris Lec. Okkak.
Leptura sp. Caribou Island.
Criocephalus obsoletus Randall. Okkak.
Argaleus nitens Lec. Near Cape Harrison.
Telephorus fraxini Say. Hopedale.
Podabrus lævicollis Kirby. Hopedale.

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Podabrus mandibularis Kirby. Caribou Island.

Sericosomus incongruus Lec. Square Island.

Eanus vagus Lec. Square Island.

E. pictus (Cand.) Horn. (*E. maculipennis* Lec.) Caribou Island to Square Island.

Cryptohypnus bicolor Germ. Belles Amours, Strawberry Harbor and Indian Harbor.

Byrrhus americanus Lec. Caribou Island.

B. Kirbyi Lec. (*B. picipes*). Caribou Island.

Atomaria. Not determined. Caribou Island.

Ips sanguinolentus Oliv. Caribou Island.

Bledius. Not determined.

Quedius sublimbatus Mökl. Blanc Sablon (R. Bell).

Tachyporus n. sp. Hopedale.

Creophilus villosus Gray. Caribou Island.

Agathidium obsoletum Lec. Square Island.

Silpha Lapponica Linn. Caribou Island to Hopedale.

Philhydrus bifidus Lec. Caribou Island.

Gyrinus picipes Aubé? Square Island.

G. minutus Linn. Square Island.

G. affinis Aubé? Square Island.

Colymbetes picipes Kirby. Caribou Island and Strawberry Harbor.

C. binotatus Harris (probably).

C. sculptilis Harris. Caribou Island, Square Island, Hopedale.

C. nov. sp. Square Island.

Agabus parallelus Lec. Square Island.

A. longulus Lec.? Stupart's Bay (R. Bell).

A. ambiguus Lec. (*A. infuscatus* Aubé). Caribou Island.

A. subfasciatus Lec. Caribou Island.

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A. semipunctatus (Kirby). Caribou Island.

A. lævidorsus Lec. Caribou Island.

A. punctulatus Aubé. Caribou Island.

A. discolor Lec. Indian Harbor.

Hydroporus catascopium Say. Square Island and Dumplin Harbor.

H. tenebrosus Lec. Caribou Island.

H. puberulus Lec. Sloop Harbor and Dumplin Harbor.

H. longicornis. Stupart's Bay (R. Bell).

H. perplexus Shp. Stupart's Bay (R. Bell).

Trechus micans Lec. Belles Amours.

Patrobus tenuis Lec. Square Island.

P. hyperboreus Dejean. Belles Amours, Strait of Belle Isle; Cape Chidley (R. Bell).

Harpalus herbivagus Say., var. *proximus* Lec. Square Island.

Amara obtusa Lec.

Amara, near *A. melanogastrica* Esch., perhaps *A. brunni.*

A. pennis Dej. Caribou Island.

Amara, "no name." Strawberry Harbor, Square Island, and Hopedale.

A. similis Lec. (*Stereocerus similis* Kirby). Caribou Island.

A. hæmatopus Kirby. Sloop Harbor, Hopedale, Okkak (S. Weiz).

Pterostichus adstrictus Esch., var. *orinomum* Kirby. Mecatina; Gulf St. Lawrence.

Pterostichus hudsonicus Lec. Stupart's Bay (R. Bell).

Pt., species not determined. Hopedale, Tinker Island, off Cape Harrison (Cape Webuc).

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Pt. luczottii Dej. Blanc Sablon (R. Bell).

Platynus sinuatus Dej. Belles Amours, Strait of Belle Isle.

Calathus ingratus Dej. Whole coast.

Carabus chamissonis Fischer. Domino Harbor and Okkak.

Nebria Sahlbergii Fischer. Sloop Harbor, Cape Chidley (R. Bell).

Notiophilus Sibiricus Motsch. Domino Harbor, Square Island.

Diptera.

Scatina estotilandica Rondani, Archiv, etc. Canestrini iii., fasc. 1, 35, Labrador. Osten Sacken adds: Mr. Rondani, in the same place, mentions *Scatophaga diadema* Wiedemann (Montevideo) as having been received from Labrador.

Helophilus glacialis Loew. Stett. Ent. Zeit. vii., 121.

Helophilus grœnlandicus (O. Fabr.).

Dolichopus stenhammari Zett. Sloop Harbor, July 19.

Therioplectes flavipes Wied.

Therioplectes septentrionalis Loew. Verh. Zool. Bot. Ges Wien., 1858, 593.

Tipula tessellata Loew. Cent. iv., 4.

Tipula septentrionalis Loew. Cent. iv., 3.

Micromyia leucorum. Prof. C. W. Woodworth writes me that on examining the collection of Diptera which I made in Labrador, and which is now in the Cambridge Museum, he detected the rare European Cecidomyid *Micromyia leucorum*, "belonging to a genus hitherto unrecorded for North America." The collection consists mostly of muscids, with some interesting Empidæ.

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Amalopsis hyperborea O. Sacken. Monogr. iv., 269.
Dicranomyia halterata O. Sacken. Monog. iv., 71.

LEPIDOPTERA.

Tineidæ.

Glyphipteryx sp. Caribou Island.
Tinea fuscipunctella Haw. (= *Œcophora frigidella* Pack.). Caribou and Square Islands.
Œcophora sp. Hopedale.
Incurvaria labradorella Clem. Caribou Island.
Ornix boreasella Clem. Caribou Island.
Tinea spilotella Tengström. Caribou Island, Square Island, "Okkak, June." Christoph.
Gelechia continuella Zell. Moeschl. (= trimaculella Pack.). Strawberry Harbor.
Gelechia labradorica Moeschl. Moravian Stations.
Gelechia brumella Clem. Caribou Island.

Tortricidæ.

Grapholitha nebulosana Pack. Strawberry Harbor.
Phoxopteris plagosana (Clem.). Caribou Island and Square Island.
Phoxopteris tineana Hübn. (Pandemis leucophalerata Pack.). Hopedale.
Sericoris bipartitana (Clem.). Caribou Island.
Pædisca solicitana (Walk.) (Halonota packardiana Clem.). Caribou Island.
Sericoris turfosana H. S.
Sericoris glaciana Moeschl. Whole coast; common.
Penthina cupreana (Hübn.).
Penthina murina Pack. Caribou Island.

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Penthina septentrionana Curtis. Sloop and Strawberry Harbors. (Polar regions, Curtis.)

Penthina intermistana (Clem.). (P. tessellana Pack.). Caribou Island to Hopedale.

Penthina frigidana Pack.

Conchylis deutschiana Zetterstedt (Lozopera? fuscostrigana Clem.; C. chalcana Pack.).

Sciaphila osseana Scopoli (Ablabia pratana Hübn.)

Sciaphila moeschleriana (Wrcke).

Sciaphila niveosana Pack. Moravian Stations, August.

Pyralidæ.

Crambus unistriatellus Pack. Caribou Island.

Crambus argillaceëllus Pack. Square Island.

Crambus trichostomus Christoph. Moravian Stations.

Crambus labradorensis Christoph. "Okkak, July."

Crambus albellus Clem. Mouth of Esquimaux River, Aug. 3.

Crambus inornatellus Clem. Caribou Island, July 15.

Scoparia centuriella Sv. (*Pempelia fusca* Harv. *Eudorea? frigidella* Pack.).

Eudorea? albisinuatella Pack. Okkak.

Pyrausta borealis Pack. Square Island.

Pyrausta ephippialis Zettst.

Pyrausta torvalis Moeschl.

Phlyctænia inquinatalis Zell. (Scopula glacialis Pack.). Hopedale.

Phalænidæ.

Eupithecia luteata Pack. Caribou Island. July.

Eupithecia gelidata Moeschl. Moravian Stations.

Glaucopteryx cæsiata (S. V.). Whole coast.

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Glaucopteryx polata (Dupon.). Whole coast.
Glaucopteryx phocataria (Moeschl.). Moravian Stations.
Epirrita dilutata (Borkh.). Moravian Stations.
Petrophora truncata (Hufn.). Whole coast.
Petrophora prunata (Linn.). Whole coast.
Petrophora populata (Linn.). Whole coast.
Petrophora suspectata (Moeschl.). Moravian Stations.
Ochyria munitaria Hübn., and var. *labradorensis* Pack. Caribou Island.
Ochyria abrasaria H. Sch. Caribou Island.
Rheumaptera lugubrata Staud. Whole coast.
Rheumaptera hastata (Linn.). Whole coast.
Rheumaptera disceptaria (F. R.). Moravian Stations.
Triphosa dubitaria (Linn.). Caribou Island.
Semiothisa dispuncta (Walk.). (Sex-maculata Pack.). Square Island.
Anaitis sororaria Hübn. Moravian Stations.
Aspilates gilvaria S. V. Moravian Stations.
Acidalia sentinaria Hübn. Moravian Stations.
Acidalia frigidaria Moeschl. Moravian Stations.

Noctuidæ.

Brephos parthenias (Linn.). Moravian Stations.
Plusia u-aureum Boisd. Moravian Stations.
Plusia parilis Hübn. Moravian Stations.
Plusia divergens Fabr Moravian Stations.
Anarta funesta (Thunberg). Moravian Stations.
Anarta melanopa (Thun.). Moravian Stations.
Anarta melaleuca (Thun.). Moravian Stations. Whole coast.

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Anarta vidua Christoph. Moravian Stations.
Anarta cordigera (Thun.). Moravian Stations.
Anarta algida Lef. Moravian Stations.
Anarta lapponica (Thun.). Moravian Stations.
Anarta schonherri Zett. Moravian Stations.
Anarta zetterstedtii Staud. Moravian Stations.
Hadena exulis Lef. Moravian Stations.
Hadena exornata Moeschl. Moravian Stations.
Pachnobia carnea Thun. Moravian Stations. Whole coast.
Pachnobia okakensis. Packard. Okkak.
Mamestra arctica Boisd. Whole coast.
Dianthoecia subdita Moeschl. Moravian Stations.
Dianthoecia phoca Moeschl. Moravian Stations.
Noctua rava H. Sch. (umbratus Pack.). Moravian Stations.
Agrotis septentrionalis Moeschl. Moravian Stations.
Agrotis fusca Boisd. Moravian Stations.
Agrotis Wockei Moeschl. Moravian Stations.
Agrotis speciosa Hübn. Moravian Stations.
Agrotis comparata Moeschl. Moravian Stations.
Agrotis dissona Moeschl. Moravian Stations.
Agrotis conflua Tr. Moravian Stations.
Agrotis littoralis Pack. Caribou Island.
Leucania rufostrigata Pack. Caribou Island.

Liparidæ.

Laria Rossii (Curtis). Whole coast.

Arctiidæ.

Arctia Quenselii Paykull. Whole coast.
Platarctia borealis (Moeschler). Moravian Stations.
Euprepia caja (Linn.). Whole coast.

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Hepialidæ.

Hepialus labradoriensis Pack. Caribou Island.
Hepialus hyperboreus Moeschler. Moravian Stations.

* Rhopalocera.

Brenthis chariclea (Schneid.). This is the Argynnis boisduvalii of the previous list. A detailed description of the species, drawn up exclusively from American material, will be found in the Proc. Bost. Nat. Hist. Soc., Vol. xvii., p. 297, where most of the other species are described. Caribou Island, Strait of Belle Isle, and from Square Island northward. July 14—August 3. Abundant.

Brenthis triclaris (Hübn.) = Argynnis triclaris of the previous list. Caribou Island to Hopedale, July 14—August 3.

Brenthis polaris (Boisd.) = Argynnis polaris of the former list. From Square Island northward. July 14—August 3.

Brenthis frigga (Thunb.) = Argynnis frigga of the former list. Okkak. (Rev. S. Weiz.)

Eugonia j-album (Boisd.-Lec.) = Grapta interrogationis of the previous list. Okkak. (Rev. S. Weiz.)

Œneis jutta Hübn. = Chionobas jutta of previous list. Square Island, July 14; Hopedale, August 3.

* A revised list of the butterflies obtained in Labrador by Dr. A. S. Packard, by Samuel H. Scudder. (The list was prepared for use in the present work. The species have been arranged in the descending order by the author.) In 1866 I published a list of Dr. Packard's collections in the Proceedings of the Boston Society of Natural History, vol. xi. The present list is merely a redetermination of the same material, in the light of larger collections since seen. The same order as before is followed. The specimens are mostly in my collection and in that of the Museum of Comparative Zoology.—S. H. S.

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Œneis bore (Esp.) = Chionobas bore of former list. Hopedale, Aug. 3.

Œneis œno (Boisd.) = Chionobas œno of former list. Strawberry Harbor; Hopedale, August 3.

Agriades aquilo (Boisd.) = Lycæna aquilo of former list. Sloop Harbor, July 19; Henley Harbor, August 15; Hopedale, Aug. 3.

Pieris frigida Scudd. I have not re-examined this. Caribou Island, Strait of Belle Isle, July 14–30.

Eurymus labradorensis (Scudd.). This is the *Colias palæno*, as well as the *C. labradorensis* of the previous list. The specimen referred to the former being of the same species as the latter. I will not here venture on a discussion as to the validity of the specific name retained here, but as the species was described and figured sufficiently for determination, and is the common form in south-eastern Labrador, it is easily identifiable. Caribou Island to Hopedale, July 14—August 3.

[We add the following extract from W. H. Edwards, Can. Ent. xxi. 67. Chionobas semidea Say "also flies within the Arctic circle, as far north as Cumberland Island, and in Labrador."]

Tunicates (Ascidians).

Didemnium roseum Sars. Hopedale, 10 f.

Ascidia callosa Stimps. Strait of Belle Isle, 40–50 f.

Glandula glutinans Möller. Henley Harbor, 6 f.

Cynthia pyriformis Rathke. Strait of Belle Isle.

Cynthia monoceros Möll. (*C. condylomata* Pack.). Caribou Island, 8 f.

Cynthia echinata (Linn.). Château Bay, 50 f.

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Cynthia carnea Ag. (C. placenta Pack.). Strait of Belle Isle, 40 f.; Henley Harbor, 10–20 f.; Cateau Harbor, 15 f.

Pelonaia arenifera Stimps. Strait of Belle Isle, 15 f.

Boltenia bolteni (Linn.). Strait of Belle Isle.

FISHES.

Somniosus microcephalus (Block). "Sleeper shark." Not rare all along the coast. (Stearns.)

Scomber vernalis Mitch. A few mackerel are taken in August in Salmon Bay and Red Bay. The Strait of Belle Isle is evidently the northern limit of this genus.

Pygosteus Cuvieri Brevoorti. (*Gasterosteus Cuvieri* Girard; *Gasterosteus biaculeatus* Auct. *in part*). A large number of specimens from a tidal fresh-water spring, near Salmon River, Strait of Belle Isle.

Ammodytes dubius Reinhardt. Four specimens from Sloop Harbor, collected in July. They differ from the *A. americanus* of our coast in having a much longer body. This species is probably the American one considered by some authors as the *A. tobianus*. (Putnam.)

Sebastes norvegicus Cuv. Young specimens were dredged in fifteen fathoms.

Gymnacanthus patris (Storer). Three specimens from Henley Harbor, collected in July.

Cottus scorpioides Fabr. Sculpin. (Stearns.)

Cottus grœnlandicus Cuv. and Val. Northern sculpin. (Stearns.)

Gymnacanthus pistilliger (Pallas). (Stearns.)

Hippoglossoides platessoides Fabr. Arctic dab. Common in harbors. (Stearns.)

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Pleuronectes americanus Walb. Flounder. Whole southern coast. (Stearns.)

Cyclopterus lumpus Linn. Strait of Belle Isle.

Gadus arenosus Mitchill. Eight specimens from Sloop Harbor, collected in July. From a careful comparison I am satisfied that these specimens are the same species as the common cod of New England, the *Gadus* and *Morrhua americana* of authors, and which Prof. Gill considers as identical with the *Gadus arenosus* of Mitchill. Prof. Gill also has considered specimens of the cod from Labrador, which he had examined, as identical with our common species. (Putnam.)

It happened that our vessel touched at the different harbors from Mecatina Island in the St. Lawrence Gulf to Hopedale, a distance of over six hundred miles, at times when the cod was successively making its first appearance. Thus at Gore Island, near Little Mecatina Island, we found the cod was just beginning to be taken by the fishermen, June 16. A few were seined July 6th, at Square Island, on the Atlantic coast. July 12th they were evidently breeding, as the females were full of spawn, their livers poor, with little oil in them, and the fish were generally in poor condition. At Tub Island Harbor, which is situated on the south side of Hamilton Inlet, the fishery had not begun July 17th. Three days later a few were seined at Sloop Harbor, on the north side of Hamilton or Invuctoke Inlet, while at Strawberry Harbor, about fifty miles to the northward, they were caught in abundance on the 25th of July. The season was so cold and stormy, owing to the presence of the drift ice in an unusual quantity, and for a much longer period than for many years previous, that the fishery

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was almost a failure, scarcely half as many fish having been taken as during the preceding year. It was the same with the salmon and the capelin.

The "rock cod," or *duffy*, as it is termed by the fishermen, which they consider less valuable than the deep water cod, swarms about the boats when the fisherman are seining the capelin, and are seen snapping them up.

Gadus ogac Richardson. Greenland codfish. (Stearns.)

Merlucius vulgaris Fleming? I was told by a fisherman that he had taken but one hake during a period of forty summers spent on this coast. He had never seen a haddock on this coast. Both of these species are abundant at the mouth of the St. Lawrence in Bay Chaleur.

Brosmius flavescens Lesueur? A "cusk" was caught in eighty fathoms in the Strait of Belle Isle. The specimen is in the Collection of the Lyceum of Natural History, Williams College.

Salmo salar Linn. Owing to the great lowering of the climate by the drift ice, the salmon fishery was almost a failure this season. The fishery had just begun at Henley Harbor, opposite Belle Isle, on the 28th of June, 1864. At Square Island they were not netted before the 12th of July; here they disappear usually about the 15th of August. July 23d they had not appeared at this point. At Thomas Bay, near Cape Harrison, they appeared on the 22d of July. At this place the salmon was said to disappear about the 20th of August. At Groswater Bay, (Hamilton Inlet), only two hundred tierces were taken during the whole season, when usually five times that number are caught.

The salmon remains upon the coast at the mouth of

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streams about a month, during the Labrador mid-summer, which corresponds in temperature to that of the middle of May in New England.

At Hopedale the salmon is quite rare, and I was informed that it was not common north of this point. It seems to be a rare species in Greenland, thus showing the close correspondence of the climate of the Labrador coast in latitude 57° to that of the southern coast of Greenland. One young specimen from a tidal stream at Belles Amours, Strait of Belle Isle, was collected June 28th.

Salmo immaculatus H. R. Storer. Three specimens from near Hopedale were collected July 29th. These specimens are unquestionably referable to the *S. immaculatus* of Storer, and are distinct from the *S. trutta* of Europe, with which species Perley and others have confounded them. They differ from *S. trutta* by having larger scales, and being without spots, as their name indicates. (Putnam.)

Salmo sp? Two specimens from the Island of Ponds, near Domino Harbor, collected in July. This species, which, from its rather imperfect condition, I have not been able to recognize, appears to be closely allied to the *S. trutta* of Europe, being spotted as in that species, but of somewhat different shape, especially of the head. There are also specimens from Greenland belonging to this species in the collection of this Society, collected by the Williams College expedition to Greenland and Labrador in 1860. (Putnam.)

Salmo hudsonicus Suckley. Three specimens from a tidal pond of brackish water on Square Island were collected July 15th. These specimens are identical with

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those mentioned by Dr. H. R. Storer as *S. fontinalis*, which Dr. Suckley referred to his *S. hudsonicus*; but from a comparison of the limited number of specimens, I am yet in doubt whether the Labrador brook trout differs specifically from the *S. fontinalis* of New England. (Putnam.)

Mallotus villosus Cuv. The capelin, capelina of the Portuguese fisherman (Parkhurst, 1578), was very late in making its appearance on the coast this season, owing to the great quantity of ice, which likewise detained the cod. At Square Island, the 12th of July was the earliest date of their appearance in great numbers. July 4th, the young, about one inch in length, were seen swimming in the water, their bodies very transparent, so as to enable the vertebræ and ribs to be distinctly seen, and provided with very plainly marked heterocercal tails, in the upper and larger fork of which the vertebral column terminated.

The capelin spawns on pebbly shores near the water's edge, and I was informed by two fishermen who had each observed the act, that during the spawning of the female, two males swim close to her and press her between them, being enabled by the large and prominent ridge on the sides of the body to retain the female in this position between, and a little below them, so that as the eggs are pressed out they are fecundated by both males. This probably accounts for the much greater proportion of males to the other sex, as in a boat-load of these fish it was often difficult to find a single female.

A very close observer, the late Capt. Nathaniel E. Atwood, who fished as far north as Groswater Bay as female.

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early as 1819, tells us in his autobigraphy :* "When the capelin came on the coast the first that arrived were males. You can tell the male from the female by external signs, so as to distinguish the sexes perfectly well. When the males had been on the coast about a week, then came a mixture of females. They look very much like a smelt, and are soft and full of spawn. We did not use them for food. On an average about one-tenth of the capelin were females. When they had deposited their spawn the males deposited their milt and made the whole water white. Then the females went off. Soon after the fishing slacked off, and we used to say they were capelin sick."

According to information received from intelligent fishermen, the capelin remains upon the coast the year round, but in winter retires to deep water. Is it not probable that the cod has the same habit of going from deep water in-shore and to elevated "banks," for the purpose of spawning during the spring and summer; and in the winter of retiring to depths inaccessible to the fisherman? Should the cod be found to present local varieties at intervals along the Atlantic coast, as seems probably the case, it would be a natural inference that it did not migrate for hundreds of miles northward, following the coming of spring from Massachusetts to Hudson's Bay. It is abundant in Massachusetts Bay and on the coast of Maine during the same time in summer that it abounds on the Labrador coast and in Greenland. All the facts observed by us tend to prove that the cod does not migrate extensively, as commonly supposed.

* U. S. Commission of Fish and Fisheries. The Fishery Industries of the United States. Section IV. Fishermen, 1887. p. 151.

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Clupea harengus, Linn. The herring fishery begins in the Strait of Belle Isle during the middle of August, after the cod fishery is over. The fact elicited from several intelligent fishermen, that the herring does not spawn abundantly upon the coast of Northern Labrador, that is, above the Mingan Islands, but visits the coast in schools after the breeding season is over, while it breeds abundantly on the coast of New Brunswick, at Bay Chaleur, the Magdalen Islands, and on the southern coast of Newfoundland, affords excellent data for limiting the southern boundary of the Arctic fish fauna on the eastern Atlantic coast. This line agrees with what we have defined* as the southern limits of the "Syrtensian Fauna," which as an assemblage peoples the coast of Labrador, and extends around the northern shore of the continent into Hudson's Bay; and southward, follows the line of floating ice, thus partially excluding Anticosti, embracing the Banks of Newfoundland, the banks lying off Nova Scotia and New England, such as Jeffries and St. George's Banks, and more faintly indicated on those banks of New Jersey which are swept by the southern extension of the Labrador or Polar current. An outlier of it is also found at the mouth of the Bay of Fundy. On the southern shores of Newfoundland, which are partially protected from the Polar current sweeping by to the eastward, upon which the Gulf Stream slightly impinges, though with a much diminished force, the herring breeds, as here the species is surrounded by physical and climatic conditions very precisely corresponding to those of Nova Scotia and Maine, thus con-

* Canadian Naturalist and Geologist. Dec., 1863.

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stituting an outlying area isolated from, and yet belonging to the Acadian district or fauna. Therefore it appears that the line of floating ice, which extends down the coast of Labrador as far as the Mingan Islands, is the northward limit of the haddock and mackerel, while the herring, a member of the Acadian fauna, does not breed in any comparative abundance north of this point. The distribution of Radiates, Mollusca, Articulates, and Fishes thus agrees very closely on the northeastern shores of the continent.

One person at Henley Harbor takes upon the average eight hundred quintals during the short summer season, and cures them there. A few herring were seined at Square Island on July 6.

I find in a lecture on the Herring Fishery by M. A. Warren, Esq., who owns one of the largest fishing establishments on the coast of Labrador, some observations on the herring as observed in Labrador and Newfoundland, which are here quoted, as the article is not likely to fall into the hands of American naturalists.

"The female herring in Newfoundland come near the shore in moderate weather, and deposit their spawn, generally at night, in from 3 to 5 fathoms of water. The males follow and shed their milt over it." . . . "It is impossible, without seeing it, to form any idea of the prodigious abundance of the ova of the herring yearly deposited in Fortune Bay, and other of the favorite spawning-beds of the herring. The water will at times be seen white with milt for many acres." . . . "From personal observation, and from all the information I can obtain, I believe there are several schules of herring that come in on different portions of our coast to spawn. It

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is certain there are several varieties of the common herring differing in size, shape, and solidity of flesh. In Fortune Bay the spawn is deposited in the months of March and April; in St. George's Bay, in the month of May, and a fortnight later on St. Barbe's. My impression is that on the southern shore of the Labrador coast the spawn is deposited in June, or early in July. During the months of August and September the Labrador coast from Mecatina to Bear Island is visited by vast shoals of large fat herring, which have in them neither roe nor milt. I consider these herring, by their size and appearance, to be of the same species or the same shoal as those which spawned in St. George's Bay, in May or in June, on the Labrador coast, and which pass on in September and October to the Arctic waters, or more probably to the depth of the ocean.

"Of late years herring-seines have been much used on the Labrador coast, almost entirely superseding the use of nets, to the manifest injury of the fishing population. These immense seines, most of them more than one hundred and twenty fathoms long, often enclose over three thousand barrels of herring. During the first two to three years over one hundred and fifty seines were used on the coast by Nova Scotia fishermen."

BATRACHIA.

Rana septentrionalis Baird. Okkak. Frogs were heard and seen at Stag Bay, Domino Harbor, Lewis Bay, Henley Harbor, and on the coast of the Gulf of St. Lawrence.

Bufo americana Lec. Salmon Bay.

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Plethodon glutinosa Baird ? A salamander of a dark slate color, with a paler dorsal stripe was observed at Belles Amours.

BIRDS.

LIST OF THE BIRDS OF LABRADOR, INCLUDING UNGAVA, EAST MAIN, MOOSE, AND GULF DISTRICTS OF THE HUDSON BAY COMPANY, TOGETHER WITH THE ISLAND OF ANTICOSTI.*

The scope of country intended to be embraced within the above heading is bounded on the north by Hudson Strait, extending from east to west; on the east by the Atlantic Ocean; on the south by the Gulf of St. Lawrence to where the parallel of 50 degrees north latitude strikes the land, then west to the intersection of the 82d degree of east longitude. The western boundary is the 82d degree of west longitude north to Hudson Strait.

The period during which my own observations were made extends from June 15, 1882, to October 3, 1884.

The principal scene of my investigations was in the vicinity of Fort Chimo, situated about 27 miles up the Koksoak River, flowing into Ungava Bay, which is an immense pocket towards the eastern portion of the south side of Hudson Strait. At this place I remained from August 6, 1882, to September 4, 1884.

The southern portions of the country are entirely subarctic in character, while the northern portions are strictly arctic.

The topography of the region is so diversified that

* By Lucien M. Turner. Reprinted by the author's permission from the Proceedings of the U. S. National Museum, 1885, pp. 233–254. Revised and brought down to 1891, by J. A. Allen.

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even a scanty description is impracticable in this connection.

The climate is scarcely less diverse, the range of the thermometer at Fort Chimo being, for the period mentioned above, 86½ degrees for the maximum, and just 50 degrees below zero for the minimum, giving a range of 136.5 degrees for that period.

Winter begins (zero of temperature) about the 1st of November and continues to the last of April. Snow falls every month in the year, and the lowest temperature of each month in the year is never above the freezing point. The warmest night showed only 54 degrees. Snow remains from the last of September to the end of May; snow-shoes have been used as late as the 19th of May. Rain seldom falls before the 11th of May, and rarely after the middle of October.

The bird-life is abundant in individuals if not in species. Some of the birds which most certainly occur within the territory, yet of which no satisfactory evidence of actual occurrence has been recorded, are with one or two exceptions omitted for obvious reasons. *Tringa maritima*, for instance, certainly occurs somewhere along the coast, but has not been detected and recorded; the same with species of Fulix.

Reference is made to the following authorities, and extracts made without comment or responsibility for their assertions:

Audubon, J. J. Birds of America; seven volumes, published from 1840 to 1844.

Nuttall. Manual of Ornithology, 2d edition, 1840.

Verrill, A. E. Notes on the Natural History of Anticosti, summer of 1861. Proceedings of the Boston Society of Natural History, vol. ix., pp. 132 to 150, inclusive.

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Coues, E. Notes on the Ornithology of Labrador, summer of 1860. Proceedings of the Academy of Natural Sciences of Philadelphia, August, 1861, pp. 215 to 257, inclusive.

Stearns, W. A. Notes on the Natural History of Labrador (with few additions on authority of Coues), 1880–'81–'82, pp. 111 to 138. inclusive, of the Proceedings of the United States National Museum, 1883.

Brewster, William. Notes on the Birds observed during a summer cruise in the Gulf of St. Lawrence. Proceedings of the Boston Society of Natural History, vol. xxii., pp. 364 to 412, inclusive, October 3, 1883.

Richardson's Fauna Boreali-Americana, vol. ii.

Kumlien, L. Bulletin of the United States National Museum, No. 15. Contributions to the Natural History of Arctic America, made in connection with the Howgate Polar Expedition, 1877–'78. Washington, 1879, pp. 69 to 105.

[The following, mostly issued since the publication of Mr. Turner's paper, are of interest as bearing upon the bird-fauna of Labrador:

Stearns, W. A. Bird-life in Labrador, American Field, April 26–Oct. 11, 1890. A series of twenty-five articles, giving at length the author's observations on the birds of Labrador.

Merriam, Dr. C. Hart. List of birds ascertained to occur within ten miles of Point de Monts, Province of Quebec, Canada, based chiefly upon the notes of Napoleon A. Comeau, Bull. Nutt. Orn Club, vol. vii., 1882, pp. 233–242; vol. viii., 1883, p. 244; The Auk, vol. i., 1884, p. 295; ii., 1885, p. 113.

Palmer, William. Notes on the birds observed during the cruise of the United States Fish Commission Schooner "Grampus" in the summer of 1887. Proc. U. S. Nat. Mus., vol. xiii., 1890, pp. 249–265.

See also a review of Mr. Turner's List in "The Auk," vol. ii., p. 368, and Mr. Turner's reply thereto ("Auk," iii., p. 140).

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The nomenclature here adopted is that of the American Ornithologists' Union Check-list of North American Birds. In Mr. Turner's list, as originally published, the names adopted, were, in the main, those of Ridgway's "Nomenclature of North American Birds," forming "Bulletin 21" of the U. S. National Museum. In the present reprint, aside from the revision of the nomenclature to bring it into conformity with the system now almost universally adopted, the only changes are the addition of a few titles to the list of authorities cited, the numbering of the species consecutively instead of in conformity with the Ridgway "Nomenclature," and the addition of critical remarks on a few species attributed to Labrador on doubtful evidence.

An asterisk (*) prefixed to a name indicates that the species is resident throughout the year. A dagger (†) similarly placed indicates breeding.

J. A. ALLEN.]

1. *Turdus mustelinus* (Gmel.). Wood Thrush.

Stearns, p. 116, asserts that he heard this species in Southern Labrador. [Labrador is quite beyond the normal range of this species, which is found only sparingly in Northern New England. Mr. Stearns omits the species from his later "Bird Life in Labrador," cited above.]

2. *Turdus fuscescens* (Steph.). Wilson's Thrush.

Audubon, vol. iii., p. 27, saw young July 20, 1833.

Brewster, p. 368, saw a pair July 24, 1881, on Anticosti. [This species can reach Labrador only as a straggler, being of rare occurrence even in Northern New England.]

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† 3. *Turdus aliciæ* Baird. Gray-cheeked Thrush.

Rare in Ungava. Common in southeastern and southern portions. Breeds wherever found in summer. Nest and eggs procured at Fort Chimo, June 28, 1884.

4. *Turdus ustulatus swainsoni* (Caban.). Olive-backed Thrush.

Brewster, p. 369, obtained an adult female at Fox Bay, Anticosti, July 11, 1881.

Verrill reports it very common (p. 137) on Anticosti. Specimens were obtained June 13 and in July, 1860, at Rupert House, by Drexler.

5. *Turdus aonalaschkæ pallasii* (Caban.). Hermit Thrush.

Brewster, p. 369, found it an abundant species at Anticosti and on the south shore of Labrador.

Verrill, p. 137, found it common at the same place.

† 6. *Merula migratoria* (Linn.). American Robin.

Abundant throughout the country. Breeding plentifully at Fort Chimo, Ungava.

7. *Saxicola œnanthe* (Linn.). Stone Chat.

Coues, p. 218, obtained, August 25, 1860, at Henley Harbor, Labrador, a single individual of this bird.

† 8. *Regulus calendula* (Linn.). Ruby-crowned Kinglet.

Common in southern portions. Audubon, vol. ii., p. 168, found them June 27, 1833, and saw the young of the year a month later.

Coues obtained a specimen August 6, at Rigolet, *vide* p. 219.

Stearns shot a single specimen at Old Fort Island, October 11, 1881, *vide* p. 116.

† 9. *Regulus satrapa* Licht. Golden-crowned Kinglet.

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Audubon, vol. ii., p. 165, found them feeding their young in August.

10. *Parus atricapillus* Linn. Black-capped Chickadee.

I am informed by credible persons, long resident in the country, that two species of chickadees occur at Northwest River, at the head of Hamilton Inlet.

Verrill, p. 138, reports it very common on Anticosti.

*† 11. *Parus hudsonicus* Forst. Hudsonian Chickadee.

Abundant everywhere in the wooded tracts. Young of the year were obtained July 19, 1882, at Davis Inlet, and in early August at Fort Chimo.

Audubon, vol. ii., p. 155, states that they found a nest in Labrador.

12. *Sitta canadensis* Linn. Red-bellied Nuthatch.

Audubon, vol. iv., p. 179, states that he saw one in Labrador which had probably been driven there by a storm.

Verrill, p. 138, reports it as common on Anticosti.

13. *Troglodytes hyemalis* Vieill. Winter Wren.

Audubon, vol. ii., p. 129, found this species in Southern Labrador, July 20, 1833.

Verrill, p. 138, states that he observed a small wren at Southwest Point, Anticosti, in July, which he thought was this species.

† 14. *Motacilla alba* Linn. White Wagtail.

Four individuals of this species were seen by Alex. Brown and James Lyall (of the Hudson Bay Company), August 29, 1883, at Hunting Bay, 4 miles south of Fort Chimo. These persons described the bird accurately, and declared they were the two parents and two young

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of the year. I must add that I place the fullest reliance in their assertion.

† 15. *Anthus pensilvanicus* (Lath.). American Titlark.

Abundant throughout the territory. Nests and eggs obtained at Fort Chimo, where it breeds plentifully.

16. *Mniotilta varia* (Linn.). Black-and-white Creeper.

A specimen was obtained at Moose Factory, May 13, 1860, and also on the 31st of that month, by C. Drexler.

Brewster, p. 369, obtained a specimen at Fox Bay, Anticosti, July 11, 1881.

17. *Helminthophila peregrina* (Wils.). Tennessee Warbler.

Obtained by Drexler, at Fort George, in June and July, 1860.

Brewster, p. 370, obtained a specimen near Fox Bay, Anticosti, July 11, 1881.

18. *Compsothlypis americana* (Linn.). Blue Yellow-backed Warbler.

Brewster, p. 370, saw a male at Fox Bay, Anticosti, July 11, 1881.

19. *Dendroica tigrina* (Gmel.). Cape May Warbler.

Specimen obtained by Drexler, May 28, 1860, at Moose Factory.

20. *Dendroica æstiva* (Gmel.). Summer Yellow Bird.

Specimen obtained by Drexler, July 12, 1860, at Fort George.

Brewster, p. 370, reports it as abundant on Anticosti.

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† 21. *Dendroica coronata* (Linn.). Yellow-rump Warbler.

Audubon, vol. ii., p. 24, found them plentiful in Labrador, with young scarcely able to fly.

Drexler obtained specimens, July 21, 1860, at Moose Factory.

† 22. *Dendroica maculosa* (Gmel.). Black-and-yellow Warbler.

Drexler obtained a specimen at Moose Factory, May 28, 1860.

Audubon, vol. ii., p. 66, reports it common, with eggs and nest in beginning of July, 1833.

Brewster, p. 371, found it abundant on Anticosti.

23. *Dendroica cærulescens* (Gmel.). Black-throated Blue Warbler.

Audubon, vol. ii., p. 63, states he found a dead one in Labrador. [This species is erroneously entered in Mr. Turner's list as "*Dendroica cærulea* (Wils.). Cerulean Warbler."]

24. *Dendroica castanea* (Wils.). Bay-breasted Warbler.

Drexler obtained a specimen at Moose Factory, June 2, 1860.

Three individuals were seen at Black Island, Hamilton Inlet, by me July 9, 1882. Two were shot, but lost in the thick undergrowth; one of the birds was actually in my hand, but escaped.

† 25. *Dendroica striata* (Forst.). Black-poll Warbler.

Abundant throughout the wooded portions of the region. Breeds plentifully at Fort Chimo, where seven nests and eggs were obtained in 1884 by me.

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26. *Dendroica blackburniæ* (Gmel.). Blackburnian Warbler.

Audubon, vol. ii, p. 48, saw several in Labrador.

27. *Dendroica virens* (Gmel.). Black-throated Green Warbler.

Brewster, p. 371, saw two or three on Anticosti.

† 28. *Dendroica palmarum hypochrysea* (Ridgw.). Red-poll Warbler.

A specimen was obtained by Drexler at Moose Factory in July, 1860.

Audubon, vol. ii., p. 55, found them plentiful in Labrador. Young seen in August.

† 29. *Seiurus aurocapillus* (Linn.). Golden-crowned Thrush.

Stearns, p. 116, records this species as breeding in Southern Labrador.

Brewster, p. 371, saw a pair at Ellis Bay, Anticosti, July 21.

Verrill, p. 137, obtained specimens at Anticosti, July 15, 1861.

† 30. *Seiurus noveboracensis* (Gmel.). Small-billed Water Thrush.

Several individuals, young of the year among them, were procured by me at Davis Inlet in August, 1884.

A specimen was procured at Moose Factory, May 26, 1860, by Drexler.

31. *Geothlypis trichas* (Linn.). Maryland Yellow-throat.

Common in southern portions of Labrador.

Stearns, p. 116, reports it from Natashquan.

Brewster, p. 371, found it at Fox Bay, Anticosti July 11.

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† 32. *Sylvania pusilla* (Wils.). Black-capped Yellow Warbler.

Audubon, vol. ii., p. 21, records it as breeding in Labrador, and a nest obtained.

Brewster, p. 371, records it from Anticosti.

† 33. *Sylvania canadensis* (Linn.). Canadian Warbler.

Audubon, vol. ii, p. 15, reports it as breeding in Labrador.

† 34. *Setophaga ruticilla* (Linn.). American Redstart.

Verrill, p. 137, records it as breeding on Anticosti, with young ones just able to fly, July 18, 1861.

A specimen was obtained by James McKenzie at Rupert House, September 3, 1860.

Brewster, p. 372, records it from Ellis and Fox Bays, Anticosti, and from Mingan, on the south shore of Labrador.

35. *Vireo olivaceus* (Linn.). Red-eyed Vireo.

Verrill, p. 138, reports it as common on Anticosti.

36. *Vireo philadelphicus* (Cass.). Philadelphia Vireo.

Individual obtained from Moose Factory, June 2, 1860, by Drexler.

37. *Vireo noveboracensis* (Gmel.). White-eyed Vireo. Audubon, vol. iv., p. 148, states that a few were seen in Labrador. [Audubon was probably mistaken, Labrador being beyond the known range of this species.]

* † 38. *Lanius borealis* Vieill. Great Northern Shrike.

Not common at Fort Chimo. Breeds there. Young, unable to fly more than a few rods, were taken by the hand at that place, June 30, 1884. Said to be common

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in the more southern portions, and there known as the "Silky Jay."

39. *Ampelis cedrorum* (Vieill.). Cedar Wax-wing.

Specimen obtained August 26, 1860, by Drexler, at Moose Factory.

† 40. *Petrochelidon lunifrons* (Say). Cliff Swallow.

Verrill, p. 137, reports it breeding in large numbers, July 15, 1861, on Anticosti.

† 41. *Chelidon erythrogaster* (Bodd.). Barn Swallow.

Breeds at Northwest River, at the head of Hamilton Inlet.

† 42. *Tachycineta bicolor* (Vieill.). White-bellied Swallow.

Common at "Big" Island, in the Koksoak River, near Fort Chimo, where it breeds abundantly. Abundant throughout the northern portions.

Brewster, p. 372, saw two at Anticosti, June 9.

† 43. *Clivicola riparia* (Linn.). Bank Swallow.

Audubon, vol. i., p. 189, states that it rarely begins to breed before June, and lays only once. Said to be plentiful on south shore of Labrador.

Verrill, p. 138, reports it plentiful on Anticosti.

* † 44. *Pinicola enucleator* (Linn.). Pine Grosbeak.

Abundant in summer only, at Fort Chimo; breeds there; nest and eggs obtained.

Plentiful in southern districts among the timbered tracts. Resident south of the "Height of Land." This bird is known as the "Mope."

45. *Carpodacus purpureus* (Gm.). Purple Finch.

Kumlien, p. 75, obtained one on shipboard off Resolution Island.

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Drexler obtained it at Moose Factory, May 28, 1860.

Occurs plentifully in southern portions.

* † 46. *Loxia leucoptera* Gmel. White-winged Crossbill.

Abundant at Fort Chimo in winter, rare during other winters. None observed in summer. Birds of the year are taken in early winter. Breeds in central portions and resident there.

47. *Acanthis hornemanni* (Holb.). Mealy Redpoll.

Very abundant in winter. Not occurring in summer from May 15 to September 1 of each year.

* † 48. *Acanthis hornemanni exilipes* (Coues). White-rumped Redpoll.

Abundant and resident. Breeds plentifully at Fort Chimo, where nests and eggs were obtained.

* † 49. *Acanthis linaria* (Linn.). Common Redpoll. Abundant and resident. Breeds plentifully at Fort Chimo, where nests and eggs were obtained.

50. *Acanthis linaria rostrata* (Coues). Greater Redpoll.

Rather common in winter. None to be seen from May 15 to September 1 of each year.

51. *Spinus tristis* (Linn.). American Goldfinch.

Kumlien, p. 76, caught an adult male on shipboard off Cape Mugford, August 22, 1877.

Occurs in southern portions of Labrador.

A bird called "Goldfinch" was described accurately, and asserted to occur occasionally at Fort Chimo, but I did not succeed in finding it.

52. *Spinus pinus* (Wils.). Pine Goldfinch.

Recorded by Audubon, vol. iii., p. 126, as common.

Brewster, p. 373, saw a flock, July 24, on Anticosti.

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* † 53. *Plectrophenax nivalis* (Linn.). Snow Bunting.

Abundant at Fort Chimo. Breeds on the islands in Ungava Bay and occasionally on the mainland. Resident in the southern portions of Labrador.

† 54 *Calcarius lapponicus* (Linn.). Lapland Long-spur.

Abundant at Fort Chimo. Breeds near the mouth of the Koksoak River and on the larger islands in Ungava Bay.

† 55. *Ammodramus sandwichensis savanna* (Wils.). Savannah Sparrow.

Common throughout the region. Breeds at the mouth of the Koksoak River and at Davis Inlet.

† 56. *Zonotrichia leucophrys* (Forst.). White-crowned Sparrow.

Very plentiful throughout the country. Breeds abundantly at Fort Chimo.

† 57. *Zonotrichia albicollis* (Gmel.). White-throated Sparrow.

Reported by Stearns, p. 117, as common and breeding in Southern Labrador.

Audubon, vol. iii., p. 154, states that this species is common, and that he saw young late in July.

Drexler obtained this species at Moose Factory, May 31, 1860.

Verrill, p. 138, reports this species as by far the most common singing bird at Anticosti.

† 58. *Spizella monticola* (Gmel.). Tree Sparrow.

Common throughout the entire country. Breeds plentifully at Fort Chimo, where eggs and nests were taken.

† 59. *Junco hyemalis* (Linn.). Black Snowbird.

Not observed in the Ungava district. Common in the eastern and southern portions of Labrador. Breeds

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at Davis Inlet and Rigolet. Known as the "Stone Chat" on the east coast.

† 60. *Melospiza lincolni* (Aud.). Lincoln's Finch.

Rare at Fort Chimo; a male obtained June 10, 1883. Common in southern portions.

Audubon, vol. iii., p. 117, found young July 4, 1833.

Drexler procured specimens at Moose Factory, May 23, 1860.

61. *Melospiza georgiana* (Lath.). Swamp Sparrow.

Audubon, vol. iii., p. 111, states it to be abundant in Labrador.

Brewster, p. 375, found it plentiful on Anticosti.

† 62. *Passerella iliaca* (Merrem). Fox-colored Sparrow.

Common in southern portions. Young obtained at Rigolet late in June and early July, 1882.

63. *Pipilo erythrophthalmus* (Linn.). Chewink; Towhee.

Audubon, vol. iii., p. 168, states that it occurs northward to Labrador. [Doubtless an error.]

† 64. *Scolecophagus carolinus* (Müll.). Rusty Blackbird.

Common. Breeds at Fort Chimo, where young just from the nest were obtained, July 10, 1884.

* † 65. *Corvus corax principalis* Ridgw. American Raven.

Abundant throughout the region. Breeds at Fort Chimo; nearly fledged young seen in nest May 18.

66. *Corvus americanus* Aud. Common Crow.

Rare and only found in southern portions.

Audubon, vol. iv., p. 89, states few were to be seen in Labrador.

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Coues, p. 226, saw one flying.

Stearns, p. 117, reports it from Eskimo River.

Verrill, p. 138, records it as very common on Anticosti. Not known to breed in Labrador.

* † 67. *Perisoreus canadensis* (Linn.). Canada Jay.

Plentiful in interior of southern and westen portions. Breeds and resident wherever found.

* † 68. *Perisoreus canadensis nigricapillus* (Ridgw.).

Coastwise and interior especially abundant. Resident and breeds at Fort Chimo.

† 69. *Otocoris alpestris* (Linn.). Shore Lark.

Common. Breeds at the mouth of the Koksoak River and at Rigolet.

† 70. *Tyrannus tyrannus* (Linn.). Kingbird; Bee Martin.

Audubon, vol. i., p. 207, found it breeding in Labrador.

71. *Contopus borealis* (Swains.). Olive-sided Flycatcher.

Audubon, vol. i., 215, records it from the coast of Labrador.

† 72. *Contopus richardsoni* (Swains.). Western Wood Pewee.

Audubon, vol. i., p. 220, states that he found it breeding in Labrador. [This was erroneously entered in Mr. Turner's list as "*Sayornis phœbe* (Lath.). Phœbe Bird."]

73. *Contopus virens* (Linn.). Wood Pewee.

Audubon, vol. i., p. 233, records it [probably erroneously] from Labrador.

74. *Empidonax flaviventris* Baird. Yellow-bellied Flycatcher.

Brewster, p. 380, reports it common at Ellis Bay, Anticosti.

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† 75. *Empidonax minimus* Baird. Least Flycatcher.

Audubon, vol. i., p. 237, found it nesting in Labrador.

Obtained by Drexler at Moose Factory, May 30, 1860.

76. *Trochilus colubris* Linn. Ruby-throated Humming-bird.

A single individual, male, was seen within 4 feet of me July 17, 1882, on the hill-top (825 feet elevation) back of the station at Davis Inlet.

Audubon, vol. iv., p. 195, states that few were seen in Labrador.

77. *Chordeiles virginianus* (Gmel.). Nighthawk.

Stearns, p. 117, records it from Natashquan.

Obtained by Drexler in August, 1860, at Moose Factory.

* † 78. *Dryobates villosus leucomelas* (Bodd.). Hairy Woodpecker.

Resident in southern portions of Labrador; probably does not occur north of the "Height of Land."

* † 79. *Dryobates pubescens* (Linn.). Downy Woodpecker.

Common and resident in southern portions; probably does not range north of 56°.

Audubon, vol. iv., p. 249, reports it from Texas to Labrador.

Brewster, p. 381, found it breeding at Fox Bay, Anticosti, July 11.

* † 80. *Picoides arcticus* (Swains.). Black-backed Three-toed Woodpecker.

Common and resident throughout the wooded portions.

* † 81. *Picoides americanus* Brehm. Banded-backed Three-toed Woodpecker.

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Common and resident throughout the wooded portions.

† 82. *Colaptes auratus* (Linn.). Yellow-shafted Flicker.

An accidental straggler was procured from the mainland near Akpatok Island, Hudson Strait, in October, 1882. Reported to be a common summer visitor to Northwest River.

† 83. *Ceryle alcyon* (Linn.). Belted Kingfisher.

A summer visitor to Northwest River, where it breeds.

Drexler obtained a specimen, May 26, 1860, at Moose Factory.

Audubon, vol. iv., p. 208, records that he has met with it from Texas to Labrador.

84. *Coccyzus americanus* (Linn.). Yellow-billed Cuckoo.

Audubon, vol. iv., p. 296, states that even in Labrador he has met with a few of them [— a statement requiring confirmation].

85. *Coccyzus erythrophthalmus* (Wils.). Black-billed Cuckoo.

Audubon, vol. iv., p. 301, states that they saw a few in clumps of low trees a few miles from the shore of the gulf. (The text evidently refers to Labrador.)

* ? † 86. *Asio accipitrinus* (Pall.). Short-eared Owl.

Common in summer only at Fort Chimo. Specimens obtained there and at Davis Inlet. A very light-colored individual was seen, July 18, 1882, at Davis Inlet. Downy young individual was obtained at Fort Chimo. Plentiful on the east shore of Hudson Bay. Not known to winter in the Ungava district.

87. *Scotiaptex cinerea* (Gmel.). Great Gray Owl.

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Specimen (No. 32306 ♂) in the Smithsonian Institution collection was obtained by James McKenzie at Moose Factory. No record from other parts of the country.

88. *Nyctala acadica* (Gmel.). Saw-whet Owl.

Specimen (No. 32301) in Smithsonian Institution was obtained at Moose Factory by James McKenzie.

* † 89. *Bubo virginianus saturatus* Ridgw. Dusky Horned Owl.

Not rare at Fort Chimo. Resident. Downy young obtained June 20, 1884.

* † 90. *Nyctea nyctea* (Linn.). Snowy Owl.

Common throughout the country. Breeds at Fort Chimo.

* † 91. *Surnia ulula caparoch* (Müll.). American Hawk Owl.

Rare at Fort Chimo. Eggs obtained June 8, 1884; and downy young nearly ready to leave the nest were taken June 20.

* † 92. *Falco islandus* Brünn. White Gyrfalcon.

Common at Fort Chimo and east coast of Labrador. Resident in northern portions, breeds at Fort Chimo.

† 93. *Falco rusticolus* Linn. Iceland Gyrfalcon.

Winter specimens only obtained at Fort Chimo. Not known to breed in the Ungava district.

* † 94. *Falco rusticolus obsoletus* (Gmel.). Labrador Gyrfalcon.

Abundant at Fort Chimo. Eggs obtained May 24. Young and adult specimens of this bird procured. Very rare in winter at Fort Chimo.

† 95. *Falco peregrinus anatum* (Bon.). American Peregrine Falcon; Duck Hawk.

Abundant at Fort Chimo. Eggs, downy young, and

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adults taken there. Does not pass the winter in the Ungava district.

† 96. *Falco columbarius* Linn. Pigeon Hawk.

Audubon, vol. i., p. 89, states that eggs and nest were found about June 1.

Coues, p. 216, met with it on two occasions; one at Groswater Bay on August 5, and on the 25th of August at Henley Harbor.

97. *Falco sparverius* Linn. Sparrow Hawk.

Coues, p. 216, saw a single individual in Labrador.

† 98. *Pandion haliaetus carolinensis* (Gm.). American Osprey; Fish Hawk.

Mr. John Ford assured me that the Fish Hawk breeds, four or five pairs of them, about 4 miles above the station of the Hudson Bay Company on Northwest River.

Nuttall, page 81, reports it from Labrador.

Brewster, p. 382, records that few were seen at Anticosti.

99. *Circus hudsonius* (Linn.). Marsh Hawk.

Audubon, vol. i., p. 105, saw it in Labrador.

100. *Accipiter velox* (Wils.). Sharp-shinned Hawk.

Richardson, vol. ii., p. 44, states that one was killed near Moose Factory and deposited by the Hudson Bay Company in the museum of London.

Verrill, p. 137, reports having seen this species near Salmon River, July 3, 1861.

* † 101. *Accipiter atricapillus* (Wils.). American Goshawk.

Resident in Ungava district. Winter specimen obtained in early December, 1882. Breeds at the "Chapel"

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near Fort Chimo. Specimen obtained from Rigolet. Known as "Partridge Hawk."

102. *Buteo latissimus* (Wils.). Broad-winged Hawk.

Specimen (No. 33209 ♂) in Smithsonian Institution collected by James McKenzie in 1862 at Moose Factory.

† 103. *Archibuteo lagopus sancti-johannis* (Gmel.). American Rough-legged Hawk.

Both light and dark phases, with their eggs, young, and adults, collected at Fort Chimo. Apparently more abundant on eastern and northern shores than on the southern portions of Labrador. Downy young were also obtained, of the black phase, July 17, 1882, at Davis Inlet. Termed "Squalling Hawk" by the planters.

† 104. *Aquila chrysaetos* (Linn.). Golden Eagle.

Specimens procured in Ungava district. Breeds in the northeastern portions among the hills. A pair also breed at the "Forks" in the Ungava district. The Eagles are termed "Grepe" by the planters, and is a word derived from some of the earlier Scandinavian settlers on the coast who apply the term *Grepe* to a Vulture.

† 105. *Haliæetus leucocephalus* (Linn.). Bald Eagle; Gray Eagle.

Nuttall, p. 75, records it as breeding and rearing its young in all the intermediate space from Nova Scotia or Labrador to the shores of the Gulf of Mexico.

106. *Ectopistes migratorius* (Linn.). Passenger Pigeon.

Specimen obtained August 16, 1860, by C. Drexler, at Moose Factory.

Verrill, p. 138, saw a single individual at Heath

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Point, Anticosti, and was informed that they are very rare there.

* † 107. *Dendragapus canadensis* (Linn.). Canada Grouse; Spruce Partridge.

Abundant throughout the wooded tracts. Resident. Eggs, downy young, and adults procured at Fort Chimo.

* † 108. *Bonasa umbellus togata* (Linn.). Ruffed Grouse..

Occurs rarely at the head of Hamilton Inlet, but only on the south side; rather common at Paradise River, flowing into Sandwich Bay, and abundantly in the valleys to the southward, where birch grows plentifully. These birds are known as "French Hens."

Audubon, vol. iv., p. 80, reports it as common from Maryland to Labrador.

* † 109. *Lagopus lagopus* (Linn.). Willow Ptarmigan.

Exceedingly abundant throughout the country. Breeds by thousands at Fort Chimo, where eggs, adults, and young in all stages were procured.

* † 110. *Lagopus rupestris* (Gm.). Rock Ptarmigan.

Plentiful everywhere on the treeless areas. Eggs, young in all stages, and adults were procured from various places.

111. *Ardea herodias* Linn. Great Blue Heron.

An individual was seen by Mr. John Saunders (of the Hudson Bay Company) to fly from the creek which is the outlet of Whitefish Lake, near Fort Chimo, in the summer of 1880. A specimen was obtained at Moose Factory by James McKenzie, August 29, 1860.

Verrill, p. 138, states that a large Heron, which ap-

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peared to be of this species, was seen at Ellis Bay, Anticosti.

† 112. *Botaurus lentiginosus* (Montag.). American Bittern.

According to Coues, p. 227, a wing of a Bittern was seen in the possession of a native at Rigolet (?).

Drexler found it breeding at Moose Factory, and obtained specimens August 29, 186–.

Verrill, p. 138, records it as common at Anticosti. A young one, just able to fly, was caught August 4.

† 113. *Hæmatopus palliatus* Temm. American Oystercatcher.

Audubon, vol. v., p. 237, found several breeding in Labrador.

† 114. *Arenaria interpres* (Linn.). Turnstone.

Occasional at Ungava Bay. A young bird of the year was obtained there in the middle of September, 1882, and an adult at Davis Inlet. Not rare on the east coast.

115. *Charadrius squatarola* (Linn.). Black-bellied Plover.

Stearns, p. 118, reports it plentiful in South Labrador. Not observed in the Ungava district. Not breeding.

116. *Charadrius dominicus* Müll. American Golden Plover.

Occurs, in fall only, at the mouth of the Koksoak. Common in the southern and western portions near the coast. Not known to breed there.

† 117. *Ægialitis semipalmata* Bonap. Semipalmated Plover.

Occurs abundantly throughout the coast region. Eggs, downy young, and adults obtained from Ungava,

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and downy young with their parents obtained from Davis Inlet. Known as "Beach Bird" in Labrador.

118. *Philohela minor* (Gmel.). American Woodcock.

Several persons assured me that they had killed woodcocks on the eastern portions of the Labrador shore.

† 119. *Gallinago delicata* (Ord.). Wilson's Snipe.

I heard and saw a male making the peculiar noise with its wings, in early June, over a swamp to the north of Davidson's Lake, a few miles from Fort Chimo. Specimens were procured, June 15, 1860, by Drexler, at Rupert House.

Coues, p. 229, met with a single specimen.

120. *Macrorhamphus griseus* (Gmel.). Red-breasted Snipe; Gray Snipe.

Rare at Fort Chimo. Common in southern and western portions. Specimens obtained at Fort Chimo and Davis Inlet.

121. *Tringa canutus* Linn. Knot; Robin Snipe.

Audubon, vol. v., p. 256, states that it ranges along the coast from Texas to Labrador, but does not record having met with it in the latter country.

Coues, p. 229, obtained at Henley Harbor a few specimens in immature plumage.

122. *Tringa maritima* Brünn. Purple Sandpiper.

Although I can find no record of the occurrence of this species in Labrador, yet it abounds on the Atlantic coasts to the north and south of Labrador in spring and fall.

† 123. *Tringa maculata* Vieill. Pectoral Sandpiper.

Common almost everywhere on the coast. Specimens

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procured by Coues, p. 230; Stearns, p. 119, and by myself.

124. *Tringa fuscicollis* Vieill. Bonaparte's Sandpiper.

Excessively abundant at the mouth of the Koksoak River in July, August, and September; also on the eastern shore of Labrador. Not known to breed in the country.

† 125. *Tringa minutilla* Vieill. Least Sandpiper.

Not common at Ungava. I have reason to believe that occasional pairs breed at the mouth of the Koksoak River.

Audubon, vol. v., p. 282, states that he found nest and eggs, July 20, 1883, in Labrador.

Coues, p. 232, observed it to be plentiful in Labrador.

Brewster, p. 386, observed a few daily on the beach at Anticosti.

Stearns, p. 119, records it common in spring and fall, and breeds in summer.

† 126. *Ereunetes pusillus* (Linn.). Semipalmated Sandpiper.

Occurs sparingly at the mouth of the Koksoak River, and from its actions indicated breeding.

Audubon, vol. v., p, 278, states he found them dispersed in pairs and having nests early in June in Labrador.

Stearns, p. 119, reports this species as common in spring and fall.

127. *Calidris arenaria* (Linn.). Sanderling.

Three individuals were seen at the mouth of the Koksoak River associated with *Tringa fuscicollis*. Two of these were obtained.

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Audubon, vol. v., p. 288, states he saw young in Labrador early in August, 1833, moving southward.

128. *Limosa hæmastica* (Linn.). Hudsonian Godwit.

Rare. Drexler obtained a specimen near Rupert House, July 30, 1860.

Stearns, p. 119, obtained a single individual at Old Fort Island.

† 129. *Totanus melanoleucus* (Gmel.). Greater Yellow-legs; Tell-tale.

Not common in Ungava district. Specimens obtained at the mouth of the Koksoak River and only in the fall.

Audubon, vol. v., p. 319, states he found this species breeding in June in Labrador.

130. *Totanus flavipes* (Gmel.). Yellow-legs.

A single individual was seen October 8 about 50 miles above Fort Chimo, on the Koksoak River, flying from a bar.

Audubon, vol. v., p. 313, states he found few of these birds in Labrador.

† 131. *Totanus solitarius* (Wils.). Solitary Sandpiper.

A single individual was obtained near Fort Chimo in July. Its actions indicated breeding.

132. *Tryngites subruficollis* (Vieill.). Buff-breasted Sandpiper.

Coues, p. 235, obtained a single individual August 20, 1860.

† 133. *Actitis macularia* (Linn.). Spotted Sandpiper.

Common at Fort Chimo, where downy young and adults were procured.

Audubon, vol. v., p. 303, states he found it breeding

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in Labrador, July 17, 1833, and obtained fully-fledged young July 29.

134. *Numenius longirostris* Wils. Long-billed Curlew.

Most diligent inquiry failed to satisfy me that this species occurs on the north, east, or southern portions of Labrador. Coues apparently satisfied himself, from inquiry, that the bird does occur there, *vide* p. 235.

135. *Numenius hudsonicus* Lath. Hudsonian Curlew.

I saw three individuals of this species in September, 1882, at the mouth of the Koksoak.

Coues, p. 235, procured a few individuals.

136. *Numenius borealis* (Forst.). Eskimo Curlew.

Several large flocks were seen September 4, 1884, flying over the mouth of the Koksoak River. Plentiful in the fall in the southern portions and as far north as Davis Inlet; they do not halt above this latter place while on their way southward.

† 137. *Crymophilus fulicarius* (Linn.). Red Phalarope.

Abundant on the Labrador coast north of Davis Inlet. Common in Hudson Strait. Rare in Ungava Bay, where a specimen was obtained. Breeds sparingly in Hudson Strait.

† 138. *Phalaropus lobatus* (Linn.). Northern Phalarope.

Breeds on the islets in Ungava Bay. Common on northern portions of the Labrador coast.

139. *Rallus virginianus* Linn. Virginian Rail.

A single specimen was taken in Hamilton Inlet a few years ago and submitted to M. Fortesque, Esq. (of the

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Hudson Bay Company), who identified it beyond question.

140. *Porzana carolina* (Linn.). Sora Rail.

Obtained by Drexler, August 26, 1860, at Moose Factory.

141. *Fulica americana* Gmel. American Coot.

A specimen was shot on a lake near Nain several years ago. Several persons who saw the stuffed bird described this species beyond possibility of doubt.

142. *Olor columbianus* (Ord). Whistling Swan.

An occasional straggler over the southern portions only of Labrador. The Eskimo of the western side and northern end of the region apply the name Kóogzhook to this bird, and is exactly the same name as is given to it by the Eskimo of Norton Sound, Alaska.

143. *Chen hyperborea nivalis* (Forst.). Greater Snow Goose.

Occasionally a straggler is seen in the western portions and along the western end of Hudson Strait. Eskimo from the eastern shore of Hudson Bay reported it to be very plentiful during the migration. Those people apply the term Kangōk to this species, and what is rare among the names of birds is, that the same term is applied to this species by the Eskimo of Norton Sound, Alaska.

† 144. *Branta canadensis* (Linn.). Canada Goose.

Common throughout the territory. Breeds along Hudson Strait near the mouth of St. George's River, where eggs, young, and adults, were procured.

Breeds plentifully on Anticosti, according to Verrill, p. 139.

145. *Branta bernicla* (Linn.). Brant.

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Seen in spring only at Fort Chimo. Not known to breed in the region.

Audubon, vol. vi., p. 205, states that it breeds from Labrador northward.

146. *Anas boschas* (Linn.). Mallard.

Rare at Fort Chimo. Common on eastern and more plentiful on southeast coast. Specimens obtained from Davis Inlet and at the mouth of the Koksoak River; known in Labrador as Mallard and Green Head.

† 147. *Anas obscura* (Gmel.). Black Mallard.

Not common in Hudson Strait. Doubtless breeds there, as a female obtained in July had the abdomen bare and no quills in the wings.

Audubon, vol. iv., p. 246, found eggs and young July 5, 1833.

Verrill, p. 139, states that it breeds abundantly on Anticosti.

† 148. *Anas strepera* (Linn.). Gadwall.

Not observed in Hudson Strait.

Verrill, p. 139, states that few specimens were seen on Anticosti, and a half-grown young one was caught near the middle of July.

149. *Anas americana* (Gmel.). Baldpate.

Mr. John Ford assures me that the Widgeon is common in Hamilton Inlet and on the southeast shore of Labrador.

150. *Anas discors* (Linn.). Blue-winged Teal.

Brewster, p. 389, records that fishermen report its occurrence at Anticosti.

151. *Anas crecca* (Linn.). English Teal.

Coues, p. 238, obtained a male in Labrador, July 23, 1860.

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152. *Anas carolinensis* (Gmel.). Green-winged Teal.

Fully-fledged young females were obtained at Fort Chimo late in July.

Coues, p. 238, saw it in a collection at Rigolet.

153. *Dafila acuta* (Linn.). Pintail.

A single (young of the year) female was taken at the mouth of the Koksoak River. An adult was procured at Davis Inlet. It is very doubtful that this species breeds in the Ungava district.

154. *Aix sponsa* (Linn.). Wood Duck; Summer Duck.

Stearns, p. 120, reports it not rare in the interior of Labrador.

155. *Aythya americana* (Eyt.). Redhead.

Stearns, p. 120, reports it as common, and saw an individual, September 20, in Baie des Roches.

156. *Glaucionetta islandica* (Gmel.). Barrow's Golden-eye.

Obtained specimens from Davis Inlet. Plentiful in the fall on the Labrador coast.

157. *Glaucionetta clangula americana* (Bp.). American Golden-eye.

Specimens were obtained from Ungava Bay, where it is abundant in fall, as it is also on the Labrador coast.

158. *Histrionicus histrionicus* (Linn.). Harlequin Duck.

Abundant in Hudson Strait. Specimens from Ungava Bay, where this duck certainly breeds. Plentiful on the eastern coast of Labrador.

† 159. *Clangula hyemalis* (Linn.). Long-tailed Duck; Old Squaw.

Abundant in the proper season along the entire coast.

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Eggs, downy young, and adults were procured at Fort Chimo.

160 *Camptolaimus labradorius* (Gmel.). Labrador Duck.

Formerly abundant. Now supposed to be extinct.

* † 161. *Somateria mollissima borealis* Brehm. Common Eider.

Abundant in Hudson Strait. Eggs, young of the year, and adults procured in Ungava Bay. Plentiful on eastern and southern coasts.

* † 162. *Somateria dresseri* Sharpe. American Eider.

Common on south shore of Labrador.

* † 163. *Somateria spectabilis* (Linn.). King Eider.

Abundant on Atlantic coast of Labrador, where it is reported to breed. Nest and eggs were found by N. A. Comeau near Mingan (*vide* Canadian Naturalist and Sportsman, vol. i., No. 7, p. 51, July 15, 1881). Not known to enter Hudson Strait.

164. *Oidemia americana* Sw. & Rich. American Scoter.

Obtained at the mouth of the Koksoak River. Abundant in Hudson Strait and eastern shore of Labrador, where it is reported to breed sparingly.

† 165. *Oidemia deglandi* Bonap. American Velvet Scoter.

Obtained from the eastern shore of Labrador. Common along all the coast.

The *Œ. fusca* of Audubon, vol. vi., p. 333, doubtless refers to this species, and he reports it as common. Nesting and young able to swim from June 1 to July 28.

† 166. *Oidemia perspicillata* (Linn.). Surf Duck.

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Rare in Hudson Strait. Abundant on the eastern coast of Labrador, where it breeds sparingly.

167. *Merganser americanus* (Cass.). American Sheldrake.

Stearns, p. 121, reports he has seen one individual of this species near Fort Island. This is probably the "Pie bird" that I heard of on the Labrador coast.

* † 168. *Merganser serrator* (Linn.). Red-breasted Sheldrake.

Abundant throughout the country. Breeds. Downy young, unfledged young, and adults were procured at Ungava and Davis Inlet. Known as "Shell-bird" on the Labrador coast.

169. *Lophodytes cucullatus* (Linn.). Hooded Sheldrake.

Stearns, p. 121, records it as rather rare, but occasional in Southern Labrador.

† 170. *Phalacrocorax carbo* (Linn.). Common Cormorant.

Not observed in Hudson Strait. Plentiful, and breeding along the eastern and southern coasts.

† 171. *Phalacrocorax dilophus* (Sw. & Rich.). Double-crested Cormorant.

Plentiful, and breeding along the eastern and southern coasts. Not observed in Hudson Strait.

† 172. *Sula bassana* (Linn.). Gannet.

Abundant and breeding on southeast and southern shores of Labrador.

173. *Gavia alba* (Gunn.). Ivory Gull.

Audubon, vol. vii., p. 150, records it from south shore of Labrador. Not known to enter Hudson Strait.

* † 174. *Rissa tridactyla* (Linn.). Kittiwake Gull.

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Breeds plentifully on the northern portions of the Atlantic coast of Labrador.

Brewster, p. 398, found young on Anticosti. Occurs but rarely in Hudson Strait. One individual was seen over 100 miles up the Koksoak River, October 13, 1883.

Verrill, p. 141, reports them breeding in immense numbers on the eastern and northern shores of Anticosti.

† 175. *Larus glaucus* Brünn. Glaucous Gull; Burgomaster.

Not rare in Hudson Strait. Not known to breed there. Breeds plentifully on the eastern and southern coasts of Labrador.

176. *Larus leucopterus* Faber. White-winged Gull.

Audubon, vol. vii., p. 159, states that few were seen in Labrador.

† 177. *Larus marinus* Linn. Great Black-backed Gull.

Not observed in Hudson Strait.

Audubon, vol. vii., p. 174, reports it common and breeding on Labrador coast.

Coues, p. 244, obtained young, a few days old, at Sloop Harbor, June 4, 1860.

Brewster, p. 395, found young of few days old on Anticosti.

Known as the "Saddler" or "Saddle-back" on the coast.

† 178. *Larus argentatus smithsonianus* Coues. American Herring Gull.

Excessively abundant in Hudson Strait, where eggs, young, and adults were obtained. Common on the Atlantic coast of Labrador.

† 179. *Larus delawarensis* Ord. Ring-billed Gull.

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Coues, p. 246, obtained three young of the year at Henley Harbor, August 21, 1860.

180. *Larus philadelphia* (Ord.). Bonaparte's Gull.

Coues, p. 247, saw immature birds.

Stearns, p. 122, reports it to be abundant in fall on the southern coast. Not known to breed in any part of Labrador.

181. *Xema sabinei* (Sab.). Sabine's Gull.

A single male was obtained in the middle of July, 1884, near the mouth of George's River, flowing into the eastern side of Ungava Bay.

182. *Sterna tschegrava* Lepch. Caspian Tern.

An individual was obtained by James McKenzie at Moose Factory.

† 183. *Sterna hirundo* Linn. Common Tern.

Audubon, vol. vii., p. 100, reports it breeding in Labrador.

† 184. *Sterna paradisæa* Brünn. Arctic Tern.

Breeds plentifully on islets in Ungava Bay; young of the year and adults and eggs were procured there. Abundant on the other coasts of the country. Known as the "Rittick" at Ungava; an Orkney Isle word.

185. *Sterna antillarum* (Less.). Least Tern.

Audubon, vol. vii., p. 119, reports it abundant and breeding on western (southern) shore of Labrador.

186. *Megalestris skua* (Brünn.). Skua Gull.

A single individual was seen near the vessel, sitting in the water off the north side of the Strait of Belle Isle, June 22, 1882.

187. *Stercorarius pomarinus* (Temm.). Pomarine Jaeger.

One was shot by Coues, p. 243.

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188. *Stercorarius parasiticus* (Linn.). Parasitic Jaeger.

Coues, p. 243, records having seen this species in Labrador. Not known to enter Hudson Strait.

189. *Stercorarius longicaudus* Vieill. Long-tailed Jaeger.

A single individual was obtained in Ungava Bay in the early part of July. Several were seen. Brewster, p. 395, saw a single individual July 20, near Mingan Harbor.

† 190. *Fulmarus glacialis* (Linn.). Fulmar Petrel.

Not observed in Hudson Strait. Excessively abundant from Cape Chidley to Strait of Belle Isle. Thousands were seen in July near the former locality.

191. *Puffinus kuhlii* (Boie). Cinereous Shearwater.

Kumlein, p. 102, reports it common from Belle Isle to Grinnell Bay.

[This species is regarded as doubtfully North American. No American specimen is known to be extant.]

192. *Puffinus major* Faber. Greater Shearwater.

Kumlein, p. 102, reports it from Belle Isle to Resolution Island.

193. *Puffinus stricklandi* Ridgw. Sooty Shearwater.

Coues, p. 243, states that he saw, on August 19, 1860, few of this species with individuals of *P. major*.

194. *Procellaria pelagica* Linn. Stormy Petrel; Mother Carey's Chicken.

One obtained (middle of July, 1882) 20 miles up the Koksoak River. Another was seen 70 miles up that river, October 9, 1882.

195. *Oceanites oceanicus* (Kuhl.). Wilson's Petrel.

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Atlantic coast of Labrador; observed mostly in spring and fall, then plentiful.

196. *Cymochorea leucorrhoa* (Vieill.). Leach's Petrel.

Atlantic coast of Labrador; observed mostly in spring and fall, then abundant.

197. *Colymbus auritus* (Linn.). Horned Grebe.

A single Grebe was seen in a tide pool at the mouth of the Koksoak River, September 15, 1882. I will not undertake to assert what species it was, as it appeared to be a bird of the year. Stearns, p. 132, reports *Podiceps holbölli* as "not rare in spring and fall. Occasionally breeds." The individual seen by me may have been of this species.

* † 198. *Urinator imber* (Gunn.). Loon.

Occurs in Hudson Strait, east and south shores of Labrador. Specimens procured from Davis Inlet and Rigolet.

199. *Urinator arcticus* (Linn.). Black-throated Diver.

Stearns, p. 122, records that two specimens were procured off the Labrador coast by one of the French priests at Bersimis. One in 1880.

† 200. *Urinator lumme* (Gunn.). Red-throated Diver.

Very plentiful throughout the county. Eggs, downy young, and adults were procured at Ungava. Known in Labrador as "Waby."

201. *Plautus impennis* (Linn.). Great Auk.

Supposed to have formerly occurred on the Labrador coast. Undoubtedly extinct now.

† 202. *Alca torda* Linn. Razor-billed Auk.

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Not observed in Hudson Strait. Abundant on eastern and southern shores, where it breeds plentifully.

† 203. *Fratercula arctica* (Linn.). Common Puffin.

Plentiful on eastern and southern coast of Labrador, where it breeds. Not known to enter Hudson Strait.

* † 204. *Alle alle* (Linn.). Sea Dove; Dovekie.

Common in Hudson Strait. Winter (December 19, 1882) specimen taken 100 miles up the Koksoak River. Occurs in myriads along the eastern shore of Labrador. Known as the "Bullbird." Breeds plentifully in certain localities not visited by me.

* † 205. *Cepphus grylle* (Linn.). Black Guillemot.

Common in Hudson Strait, east and south shores of Labrador. Breeds wherever found in summer.

* † 206. *Cepphus mandtii* (Licht.). Mandt's Guillemot.

Occurs in Hudson Strait occasionally only, according to my own observation. Plentiful on the eastern coast of Labrador. Specimens procured at Fort George by Drexler, July 17, 1861. Breeds wherever found in summer. Known as "Pigeon" or "Sea Pigeon" on the eastern coast.

* † 207. *Uria troile* (Linn.). Common Guillemot.

Plentiful on eastern and southern coast of Labrador. Not observed in Hudson Strait.

* † 208. *Uria lomvia* (Brünn.). Brünnich's Guillemot.

Obtained only from Hudson Strait, where it breeds. Abundant on eastern and southern coasts.

Besides these species the following was collected by Dr. Robert Bell, and recorded by him in the Report of the Canadian Geological Survey for 1882-83-84.

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Procellaria tenuirostris Aud. Slender-billed Fulmar. Port Burwell, 28th September.

Mammals.

Vespertilio subulatus Say. Little Brown Bat. Natashquan. (Stearns.)

Lepus americanus Erxl. (Stearns.)

Erethizon dorsatum (Linn.). Near Hopedale.

Fiber zibethicus Cuv. Henley Harbor.

Castor canadensis Kuhl. Rapidly becoming extinct on the coast.

Sciuropterus volucella (Pallas). Specimens found at St. Augustine. (Stearns.)

Sciurus hudsonius Pallas. "Common in the woods, along the southern coast. (Stearns.)

Arctomys monax (Linn.). "Common at Mingan, growing scarce towards Bonne Esperance." (Stearns.)

Zapus hudsonicus (Zimmermann). Not rare on the dry tops of many of the islands along the southern coast. (Stearns.)

Hesperomys leucopus (Rafinesque). Not rare. (Stearns.)

Arvicola sp. (Stearns).

Balænoptera. The Fin-back is frequently seen upon the coast.

Balæna mysticetus Linn. The Hump-backed Whale is commonly seen. This species shows its tail and the pale underside of the body when it "breaches"; the Fin-back does not show its tail.

Physeter macrocephalus Linn. For many years the fishermen on the coast have noticed a school of nine

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sperm whales passing up and down the coast. Lately the number has been reduced to five, one of which, probably, was seen off Domino Harbor, in a large school of "Finners" and "Hump-backs."

Sibbaldius borealis (Fischer). A Sulphur-bottom Whale was towed ashore at Old Fort Island in 1878 or 1879. (Stearns.)

Monodon monoceros Linn. While the Narwhal is abundant, going in schools, in Hudson's Strait, it had not been seen at the Moravian settlements since at least 1830.

Delphinapterus catodon (Linn.). The White Whale is not uncommonly seen passing in schools along the coast in the summer-time.

Orca gladiator (Bonnaterre). The *Killer*, which was described to me as having the head much shorter and blunter, and with longer teeth than the Grampus, from which it is easily distinguished by its sharp, dorsal fin, five or six feet high, is commonly said, by the fishermen, to attack the Right and Finback Whales, "gouging out lumps of flesh." At Belles Amours, an individual was captured, from whose stomach five shoulders of the seal were taken.

Globicephalus intermedius (Harlan). The Black-fish, or Grampus, abounds on the whole coast.

Grampus griseus (Cuvier). The Grampus occurs along the coast as far as Belle Isle, and perhaps farther. (Stearns.)

Odobœnus rosmarus (Malm.). Atlantic Walrus.

Phoca vitulina Linn. Harbor Seal. Ascends the rivers into fresh water.

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Phoca fœtida Fabr. In harbors in spring and autumn. (Stearns.)

Of the *Phoca hispida* Erxl., no information could be obtained.

Pagophilus grœnlandicus Gray. (Phoca grœnlandica auct.) This species is most abundant and extensively hunted by the sealers. The young soon after birth weigh 70–80 pounds, while the adult weighs 140–150 pounds. (Common in migrations all along the shores south of Belle Isle.)

Erignathus barbatus Gill. (Phoca barbata Fabr.). It is probably the species which is called by the sealers the "Square Flipper." It is very rare, and much the largest species known. The young weigh 140–150 pounds, while the adult will weigh 500–600 pounds.

Cystophora cristata Nilsson. The Hooded Seal is not uncommonly, during the spring, killed in considerable numbers by the sealers. The young "pelt" weighs 70–80 pounds, while the old male or "dog hood," weighs 400 pounds.

Rangifer caribou Baird. Lives in summer on the hill-tops away from the woods.

Ovibos moschatus Blainville. As the Labrador Eskimo have a distinct name for the musk-ox, it is naturally inferred that it may have formerly inhabited the northwestern part of the peninsula, as it once occurred on the opposite coast of Hudson's Bay as far south as Churchill River.

Ursus maritimus Linn. White bear.

Ursus americanus Pallas. The black bear is abundant on the southern coast, where it leaves its winter quarters in May, but above Hopedale is very rarely seen.

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Procyon lotor Storr. Raccoon. Square Island.

Lutra canadensis Sabine. Common along the whole coast.

Mephitis mephitica (Shaw). Rarely seen on the southern coast. (Stearns.)

Gulo luscus (Linn.). Wolverine. Generally distributed along the coast. (Stearns.)

Putorius vison (Schreber). The Mink is common along the coast.

Putorius vulgaris (Erxl.). This and the Ermine are common everywhere.

Putorius erminea (Linn.).

Mustela americana Turton. The American Sable or Marten is common.

Mustela pennanti Erxl. The Fisher is occasionally seen in Southern Labrador. (Stearns.)

Vulpes fulvus Linn. The Red Fox occurred commonly at Stagg Bay, with the following species of the silver and black fox. The former is not uncommon, the black very rare.

Vulpes lagopus Linn. The "Blue Fox" is exceedingly rare about the mouth of Hamilton Inlet. An old hunter told me he had seen but three of them within a period of forty years. Their fur is shorter, and the tail shorter and more bushy than the "Patch Fox." On a high isolated rock much frequented by sea-birds, I noticed a Patch Fox with a murre's egg in its mouth. It is very tame and unsuspicious on the outer islands, where it lives evidently by robbing the nests of sea-birds. It is the common statement of the hunters that the different varieties of this species are found in the same litter.

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Canis lupus Linn. The Gray Wolf is said by Stearns to be very rare.

Lynx canadensis (Desm.). The Lynx is common in winter. (Stearns.)

Appendix to Chapter XV. Zoology.

By an unfortunate oversight the end of the list of insects was left out of its proper place.

LEPIDOPTERA—*concluded.*

Eurymus nastes (Boisd.) = Colias nastes of former list. I have not re-examined specimens, as they are apparently no longer extant.

Pamphila comma (Linn.) = Hesperia comma of my former list. The single specimen obtained was not examined by me in my study of the species of Pamphila (Memoirs Bost. Soc. Nat. Hist. ii., 341), and is the only specimen I have seen of P. comma from America. It belongs to the var. catena Staud. found in northern Scandinavia and Lapland, and exactly resembles the specimen of that variety figured by me in the memoir referred to above Moschler has already noted that it is this variety which occurs in Labrador.

Hesperia centaureæ Ramb.

HYMENOPTERA.

Urocerus flavicornis Fabr. Common on Caribou Island.

Urocerus cyaneus Fabr. Hopedale.

Euura orbitalis Norton. Var. a. b. Caribou Island.

Nematus Labradoris Norton. Caribou Island.

Nematus malacus Norton. Caribou Island.

Nematus fallax Norton. Caribou Island.

Nematus monela Norton. Caribou Island.

Nematus fulvipes Norton. Caribou Island.

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Nematus placentus Norton. Caribou Island.

Allantus originalis Norton. Caribou Island.

Macrophya (Pachyprotasis) omega Norton. Caribou Island.

Tenthredo mellinus Norton. Caribou Island.

Tenthredo cinctitibiis Norton. Caribou Island.

Formica herculanea Linn. Whole coast.

Formica sanguinea Latr. Strait of Belle Isle.

Vespa maculata Linn. Southern coast, Mecatina Island.

Vespa norvegica Fabr. Caribou Island.

Bombus lacustris Cresson. Whole northern coast; common.

Bombus kirbyellus Curtis. Sloop Harbor and Hopedale.

Bombus frigidus Smith. Square Island and Hopedale.

Bombus nivalis Dahlb. Caribou Island and whole coast northward.

* *Ichneumon lariæ* Curtis. Ross' Voyage. Fig. 1. Okkak.

"This species labelled *I. erythrosomus* by Holmgren seems to me to be the same as *I. lariæ* of Curtis, only differing in the color from our specimens from Greenland." (C. Aurivillius in letter.)

Ichneumon nigrorufus. Fide Holmgren. Caribou Island.

Ichneumon Packardii Holmgren MS. Hopedale.

Cryptus Fabricii Schiocdte. Tub Island.

Campoplex arcticus Curtis? Caribou Island.

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*The Ichneumonidæ were partially named by the late Mr. A. E. Holmgren of Sweden, the work having been interrupted by his death. Besides these about twenty other species were collected, with two or three species of Chalcididæ.

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CHAPTER XVI.

THE BOTANY OF THE LABRADOR COAST.

VERY little herbalizing has been done on the shores of this region and none at all in the interior. The earliest paper devoted especially to Labrador botany appears to be E. Meyer's *De plantes labradoricis* published at Leipzig in 1830. The late Rev. Samuel Weiz, for many years missionary at Hopedale, kindly allowed us while at that station in 1864 to make a copy of his list of northern Labrador plants. As regards the botany of the St. Lawrence or Gulf Coast of Labrador we know more. The Rev. S. R. Butler, a missionary and successor of the Rev. C. C. Carpenter at Caribou Island, near the mouth of Eskimo River, botanized several seasons on Caribou Island, at Forteau Bay and L'Ance Amour, and the results are given in his excellent list entitled "Labrador Plantes," published in the Canadian Naturalist.* This list was added to by Mr. W. A. Stearns,† who collected at Harrington Harbor, Baie des Roches, Bonne Espérence and Salmon Bay and at a point seven miles up the Eskimo River. Miss MacFarlane also afforded Mr. Butler "much valuable material." Reference may also be made to Sir John Richardson's list of plants col-

* Vol. v. 1870. September No.

† Proc. U. S. Nat. Mus. VI. No. 8. Aug. 1. 1883.

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lected on the Island of Anticosti and coast of Labrador in 1860. While the plants of the Gulf coast are a mixture of arctic, subarctic and Alpine floras with that of the northern Canadian shores of the St. Lawrence River, those of northern Labrador are naturally more purely arctic.

The extreme northern point touched by an observer of plant life in Fort Chimo. In the introduction to his list of birds of Labrador * Mr. Turner thus refers to the vegetation :—"The limit of trees ceases only 10 miles north of Fort Chimo. The principal trees are species of Abies, Larix, Betula, Populus, Alnus, Salix, and Juniperus. The more common flowering plants are Anemone, Ranunculus, Draba, Viola, Arenaria, Stellaria, Lathyrus, Potentilla, Rubus, Ribes, Saxifraga, Epilobium, Heracleum, Taraxacum, Vaccinium, Kalmia, Rhododendron, Ledum, Pinguicula, Gentiana, Empetrum, Habenaria, Iris, and Smilacina. Of sedges and grasses, Juncus, Scirpus, Eriophorum, Carex, Poa, Elymus, and Aira are the more common." Dr. Robert Bell collected plants on the northern coasts, which were identified by Prof. Macoun, and are embraced in the list given beyond.

Dr. Koch† thus writes regarding the forests and vegetation at Nain, a point not far from the northern limit of trees: "The northernmost valleys in which firs grow open into Napartok Bay. North of Napartok Bay ‡ (Napartok means fir) [more properly spruce] are found only dwarf willows and birches; mosses and lichens form

* Proc. U. S. Nat. Mus. VIII. Nos. 15, 16, 1885.

† Deutsche Geographische Blätter, Bremen, 1884.

‡ Napartok Bay is just south of the 58th parallel of latitude.

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the principal covering of the ground. In the south, near the coast, the forests have been partly destroyed by reckless cutting, and the devastated character of the region about Hopedale is due in great part to the destruction of the forests on the valley sides by the Eskimo. As everything naturally grows slowly on account of the short summer, the trunks of the firs are subjected to great tension, so that those which have lost their bark seem twisted like corkscrews. Hand in hand with this goes on a rapid new growth of the thickness of the trunk towards the top; both causes render the wood useless for timber. On account of the short spring this country, like other arctic regions, has a flora numerically rich in individuals but poor in species, and it reminds one of the alps and the mountains of Norway. Of the plants, besides bilberries and cranberries, only a kind of cochlearia and cloudberry (in Eskimo *Akbik*) are useful, the latter being used by the Eskimo in attacks of scurvy, hence for that reason it is much valued and gathered. In consequence of this many places are named for it, for example Akbikse, Akbiktok, *viz.* places where Akbik grows.

"Moreover the missionaries raise potatoes and cabbages, but not only is the seed sown with much trouble —for the garden must be dug out of the snow in spring —but also during the summer they must be covered every night with mats on account of the nightly frosts."

Of the mosses of Labrador what is known is probably comprised in a paper entitled *Moosvegetation and Moosbeaude in Labrador.*

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CATALOGUE OF THE PLANTS REPORTED BY VARIOUS TRAVELLERS AND OTHERS AS GROWING ON THE COAST OF LABRADOR.

COMPILED BY JOHN MACOUN, NATURALIST OF THE DEPARTMENT OF INTERIOR, OTTAWA, CANADA.

RANUNCULACEÆ.

7. *Anemone parviflora* Michx. Coast of Labrador (Torr. and Gray, p. 12); common on the highlands of Forteau (W. E. Stearns); Hopedale (Weiz).

20. *Thalictrum dioicum* Linn. On Caribou Island (S. R. Butler); common on highlands along the margins of streams, and in the interior at Forteau (W. E. Stearns).

22. *Thalictrum Cornuti* Linn. Coast of Labrador at Forteau (McGill Coll. Herb).

34. *Ranunculus affinis* R. Br. Hopedale (Weiz).

40. *Ranunculus pygmæus* Wahl. Coast of Labrador (Pursh); Hopedale (Weiz).

44. *Ranunculus nivalis* Linn. From Labrador and Spitzbergen (Torr. and Gray, page 21); Hopedale (Weiz).

54. *Caltha palustris* Linn. Strait of Belle Isle (J. Richardson); Hopedale (Weiz). See *R. Americanus* (J. M.).

57. *Coptis trifolia* Salisb. Labrador and north to lat. 58° (Hooker); on hills, Caribou Island (S. R. Butler).

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NYMPHÆACEÆ.

95. *Nuphar advena* Ait. Ponds, Caribou Island (S. R. Butler).

SARRACENIACEÆ.

100. *Sarracenia purpurea* Linn. Not infrequent in bogs. (Hooker).

PAPAVERACEÆ.

102. *Papaver nudicaule* Linn. Hopedale Islands, Weiz.

CRUCIFERÆ.

Cardamine pratensis Linn. Wet, swampy meadows (Brunot); Hopedale (Weiz). See *C. Cellidifolia.*

143. *Arabis alpina* Linn. Coast of Labrador (Colmaster); Forteau Bay, by the seashore (S. R. Butler); Hopedale Islands (Weiz).

144. *Arabis stricta* Huds. Coast of Labrador (Colmaster *vide* Pursh). This is very likely Arabis confinis, Watson. Hopedale Island (Weiz).

169. *Draba alpina* var. (?) *corymbosa*, Durand. Coast of Labrador (Abbé Brunot).

170. *Draba stellata* var. *nivalis*, Regd. Coast of Labrador (Colmaster *vide* Hooker).

175. *Draba incana* Linn. D. contorta Ehrh.; Weiz' List. D. glabella Richardson; Weiz, List. Coast of Labrador (Pursh); Hopedale (Weiz).

Var. *confusa* Poir. Nachvak, coast of Labrador (R. Bell); Hopedale (Weiz).

176. *Draba arabisans* Michx. Hopedale (Weiz).

177. *Draba aurea* Vahl. Hopedale (Weiz).

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182. *Cochlearia officinalis* Linn. Coast of Labrador (Abbé Brunot); Hopedale (Weiz).

185. *Cochlearia tridactylites* Banks. Coast of Labrador (Sir Joseph Banks); Cape Charles (Abbé Brunot); Hopedale (Weiz); Seashore, Caribou Island (S. R. Butler).

197. *Capsella bursa-pastoris* Mœnch. Introduced. Caribou Island (S. R. Butler); Hopedale (Weiz).

VIOLACEÆ.

240. *Viola canina* var. *sylvestris*, Regel. V. Muhlenbergii ? Weiz' List. Hopedale (Weiz); Caribou Island (S. R. Butler).

229. *Viola blanda* Willd. Hopedale (Weiz).

CARYOPHYLLACEÆ.

263. *Silene acaulis* Linn. Caribou Island (S. R. Butler); Hopedale (Weiz).

264. *Lychnis apetala* Linn. Coast of Labrador (Judge Morrison).

266. *Lychnis alpina* Linn. Coast of Labrador (Judge Morrison); Ungava Bay (Barnston); Nachvak (R. Bell); Hopedale (Weiz).

281. *Arenaria verna* Linn. A. juniperina Pursh; Weiz' List; Caribou Island (S. R. Butler); Cape Charles and Amour Bay (Abbé Brunot); Coast of Labrador (Pursh); Hopedale (Weiz).

287. *Arenaria Grœnlandica* Spreng. Nain and Ford's Harbor (R. Bell); Hopedale (Weiz); summits of low hills at Baie des Roches, abundant (W. E. Stearns); Caribou Island (Butler).

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288. *Arenaria serpyllifolia* Linn. Coast of Labrador. Introduced. (Abbé Brunot.)

291. *Arenaria peploides* Linn. Honkenya peploides Ehrh.; Butler's List; Coast of Caribou Island (S. R. Butler); Hopedale (Weiz).

295. *Stellaria borealis* Bigel. Hopedale (Weiz).

298. *Stellaria crassifolia* Ehrh. Arenaria norvegica? Weiz' List. Rather common in damp localities along the coast (W. E. Stearns); Hopedale, Weiz.

300. *Stellaria longipes* Goldie. Var. minor, Hook. Hopedale (Weiz); Nain (R. Bell).

Var. *Edwardsii* Torr. and Gr. Hopedale (Weiz); Coast of Labrador (Miss Macfarline) Caribou Island? (Butler.)

305. *Stellaria humifusa* Rottb. Arenaria Purshiana, Seringe; Weiz' List; Nain, along the coast (R. Bell); Hopedale (Weiz); seashore of Labrador (Pursh); Sea-beach, Caribou Island (S. R. Butler).

311. *Cerastium alpinum* Linn. Forteau Bay (S. R. Butler); Hopedale Islands (Weiz); Ford's Harbor and Nain (R. Bell).

Var. *glabratum* Hook. Hopedale (Weiz); Nachvak (R. Bell).

318. *Sagina nodosa* E. Meyer. Mingan Islands and Labrador Coast. (St. Cyr); Caribou Island (S. R. Butler).

321. *Spergularia salina* Presl. Brackish sands along the coast (Abbé Brunot).

PORTULACACEÆ.

340. *Montia fontana* Linn. Coast of Labrador (Gmelin.)

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LEGUMINOSEÆ.

499. *Astragalus alpinus* Linn. A. Labradoricus, Hook.; Weiz' List. Caribou Island or Forteau Bay (S. R. Butler); Hopedale (Weiz); Nain and Nachvak (R. Bell).

525. *Oxytropis podocarpa* Gray. Labrador and the Arctic regions, (Dr. Gray).

527. *Oxytropis campestris* L. Var. cærulea, Koch. Coast of Labrador, (Abbé Brunot); Ford's Harbor and Nachvak (R. Bell); Hill-sides near Forteau Light-house, (S. R. Butler); Hopedale (Weiz).

533. *Hedysarum boreale* Mott. Hopedale (Weiz); Forteau Bay (S. R. Butler).

556. *Lathyrus maritimus* Bigel. Pisum maritimum, Linn.; Weiz' List. Hopedale (Weiz); Caribou Island (S. R. Butler.)

559. *Lathyrus paluster* Linn. Caribou Island and Forteau Bay, (S. R. Butler.)

ROSACEÆ.

571. *Prunus Pennsylvanica* Linn. Cerasus——? Butler's List. Caribou Island. (S. R. Butler.)

588. *Rubus Chamæmorus* Linn. Ford's Harbor (R. Bell); Straits of Belle Isle (St. Cyr.); Hopedale (Weiz); Caribou Island (S. R. Butler).

589. *Rubus arcticus* Linn. Peat bogs, coast of Labrador (Abbé Brunot); Hopedale (Weiz); Caribou Island (S. R. Butler).

Var. *grandiflorus* Ledeb. Coast of Labrador (Hooker); Nain and Nachvak (R. Bell).

592. *Rubus triflorus*, Rich. Forteau Bay (S. R. Butler).

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605. *Dryas octopetala* Linn. D. tenella, Pursh; Weiz' List. Hopedale (Weiz); Nachvak and Cape Chudley (R. Bell); Hill tops, Point Amour (S. R. Butler).

612. *Geum rivale* Linn. In springy places along the coast (W. E. Stearns).

613. *Geum triflorum* Pursh. Dry rocky ground (Judge Morrison).

618. *Sibbaldia procumbens* Linn. Coast of Labrador (M'Gill Coll. Herb.); Hopedale (Weiz).

625. *Potentilla Norvegica* Linn. Forteau Bay and Caribou Island (S. R. Butler); Nain (R. Bell).

637. *Potentilla nivea* Linn. Hopedale (Weiz).

641. *Potentilla maculata* Poir.

P. Salisburyensis Hænke; Weiz' List.

P. aurea Oeder; Weiz' List.

P. crocea Haller; Weiz' List. Hopedale (Weiz); Nain and Nachvak (R. Bell); on hills at Amour (S R. Butler).

643. *Potentilla emarginata* Pursh. Coast of Labrador (Colmaster).

645. *Potentilla palustris* Scop.

Comarum palustris Linn.; Weiz' List. Hopedale (Weiz); Caribou Island. (S. R. Butler).

647. *Potentilla fruticosa* Linn. Coast of Labrador (Hooker).

648. *Potentilla tridentata* Solander. Hopedale (Weiz); Caribou Island (S. R. Butler).

649. *Potentilla Anserina* Linn. Hopedale (Weiz); Caribou Island (S. R. Butler).

653. *Alchemilla vulgaris* Linn. South coast of Labrador near Amour (S. E. Butler); collected in several

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localities along the coast (W. E. Stearns); Hopedale (Weiz).

656. *Poterium Canadense* Benth. & Hook. *Sanguisorba Canadensis*, Linn.; Weiz' List. Hopedale (Weiz); common on dry sloping flats along the coast (W. E. Stearns); Caribou Island (Butler).

674. *Pirus Americana* DC. Var. microcarpa, Torr. & Gr. Caribou Island, (S. R. Butler). Not rare on the coast (W. E. Stearns); Hopedale (Weiz).

685. *Amelanchier Canadensis* Var. (?) oligocarpa, T. & Gr. South coast of Labrador at Amour and Caribou Island (S. R. Butler).

SAXIFRAGACEÆ.

686. *Saxifraga oppositifolia* Linn. Hopedale (Weiz); on rocks at Amour (S. R. Butler).

688. *Saxifraga Aizoon* Jacq. Coast of Labrador (Judge Morrison); Hopedale (Weiz).

690. *Saxifraga cæspitosa* Linn. Var. Grœnlandica, Wahl; S. Grœnlandica, Linn.; Weiz' List. Hopedale (Weiz); Forteau Bay (S. R. Butler); Nachvak (R. Bell).

693. *Saxifraga rivularis* Linn. Hopedale (Weiz); Coast of Labrador, (M'Gill Coll. Herb.); Nachvak (R. Bell).

695. *Saxifraga cernua* Linn. Hopedale (Weiz); Coast of Labrador (Pursh).

698. *Saxifraga nivalis* Linn. Hopedale (Weiz); Nachvak (R. Bell); Coast of Labrador (Pursh); Caribou Island, (S. R. Butler).

702. *Saxifraga hieracifolia* Waldst. and Kit. Hopedale (Weiz).

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713. *Saxifraga tricuspidata* Retz. Coast of Labrador (McGill Coll. Herb.); Nachvak (R. Bell).

714. *Saxifraga aizoides* Linn. Southeast coast of Labrador (S. R. Butler); Hopedale (Weiz); Nachvak (R. Bell).

724. *Mitella nuda* Linn. Cool damp places (Hooker).

737. *Parnassia palustris* Linn. Hopedale (Weiz); Coast of Labrador (Hooker).

740. *Parnassia Kotzebuei* Cham. and Schlecht. Hopedale (Weiz); Coast of Labrador (M'Gill Coll. Herb.).

753. *Ribes prostratum* L'Her. R. glandulosum, Ait.; Weiz' List. Hopedale (Weiz); Caribou Island (S. R. Butler).

CRASSULACEÆ.

769. *Sedum Rhodiola* DC. Nain, Nachvak, and Ford's Harbor (R. Bell); Hopedale (Weiz).

DROSERACEÆ.

771. *Drosera rotundifolia* Linn. Coast of Labrador (Hooker); Hopedale (Weiz); Caribou Island (S. R. Butler).

HALORAGEÆ.

781. *Hippurus vulgaris* Linn. Coast of Labrador (Hooker); Hopedale (Weiz).

ONAGRACEÆ.

786. *Epilobium angustifolium* Linn. Hopedale (Weiz); Coast of Labrador (Hooker); Caribou Island, (S. R. Butler); Nain and Nachvak (R. Bell).

787. *Epilobium latifolium* Linn. Hopedale (Weiz);

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Amour Bay, on the south coast, and Caribou Island (S. R. Butler).

789. *Epilobium alpinum* Linn. E. nutans, Lehm.; Weiz' List. Hopedale (Weiz); South coast of Labrador (Abbé Brunot).

794. *Epilobium palustre* Linn. Var. lineare, Gray. Hopedale (Weiz); Coast of Labrador (Judge Morrison).

UMBELLIFERÆ.

871. *Archangelica atropurpurea* Hoffm. Angelica Archangelica, Schrank; Weiz' List. Hopedale (Weiz); On the south coast at Amour Bay and Caribou Island (S. R. Butler).

872. *Archangelica Gmelini* DC. Coast of Labrador, (McGill Coll. Herb.); Strait of Belle Isle (St. Cyr).

864. *Ligusticum Scoticum* Linn. Caribou Island (S. R. Butler).

883. *Heracleum lanatum* Michx. Caribou Island, (S. R. Butler); Coast of Labrador (Hooker).

CORNACEÆ.

885. *Cornus Canadensis* Linn. Caribou Island, and Forteau Bay (S. R. Butler); Nain (R. Bell); Hopedale (Weiz).

896. *Cornus Suecica* Linn. Coast of Labrador (Abbé Brunot); Caribou Island (S. R. Butler); Ford's Harbor (R. Bell).

CAPRIFOLIACEÆ.

916. *Viburnum pauciflorum* Pylaie. Caribou Island (S. R. Butler).

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919. *Linnæa borealis* Linn. Hopedale (Weiz); Caribou Island (S. R. Butler).

929. *Lonicera cærulea* Linn. In bogs, frequent (Hooker); Caribou Island (S. R. Butler).

RUBIACEÆ.

941. *Galium trifidum* Linn. (*G. Claytoni* Hook.; Weiz' List.) Hopedale (Weiz); Caribou Island (S. R. Butler).

COMPOSITÆ.

984. *Solidago macrophylla* Pursh. (*S. thyrsoidea* E. Meyer; Weiz' List.) Hopedale (Weiz); Caribou Island (S. R. Butler); Ford's Harbor (R. Bell).

986. *Solidago Virgaured*, var. *alpina* Bigel. Hopedale (Weiz); Ford's Harbor and Nachvak (R. Bell).

987. *Solidago multiradiata* Ait. Along the coast of Labrador (Judge Morrison).

1019. *Aster Radula* Ait., var. *strictus* Gray. Caribou Island (S. R. Butler); Hopedale (Weiz); coast of Labrador (Pursh).

1079. *Erigeron uniflorus* Linn. Hopedale (Weiz); coast of Labrador (Colmaster); Nachvak (R. Bell).

1092. *Erigeron acris* Linn. Coast of Labrador (Torr. and Gray); Hopedale (Weiz).

1098. *Antennaria dioica* Gærtn. Coast of Labrador (Hooker); Hopedale (Weiz).

1099. *Antennaria alpina* Gærtn. Coast of Labrador (Colmaster); Hopedale (Weiz); Caribou Island (S. R. Butler).

1100. *Antennaria Carpathica* R. Br. Coast of Labrador (Dr. Gray).

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1106. *Gnaphalium Norvegicum* Gunner. (*G. sylvaticum* Linn.; Weiz' List.) Hopedale (Weiz); coast of Labrador (Torr. and Gray).

1110. *Gnaphalium supinum* Vill. (*G. pusillum* Hænke; Weiz' List.) Coast of Labrador (Dr. Morrison); Hopedale (Weiz).

1173. *Achillea Millefolium* Linn., var. *nigrescens* E. Meyer. Hopedale (Weiz); Nain (R. Bell); Caribou Island (S. R. Butler).

1193. *Artemisia borealis* Pall., var. *spithamœa* Torr. and Gray. Coast of Labrador (Colmaster); Hopedale Islands (Weiz).

1214. *Petasites palmata* Gray. Swamps, Labrador coast (Hooker); Hopedale Islands (Weiz).

1122. *Arnica alpina* Murr. Coast of Labrador (Torr. and Gray); Hopedale Islands (Weiz); Nachvak and Cape Chidley (R. Bell).

1242. *Senecio Pseudo-Arnica* Less. Hopedale Islands (Weiz); coast of Labrador (Hooker).

1244. *Senecio frigidus* Less. Coast of Labrador (Dr. Gray).

1237. *Senecio aureus* Linn., var. *borealis*, Torr. and Gray. Nachvak (R. Bell); Hopedale Islands (Weiz).

1286. *Hieracium vulgatum* Fries. Coast of Labrador (Colmaster); Hopedale Islands (Weiz).

1308. *Taraxicum officinale* Weber, var. *alpinum*, Koch. Not uncommon along the coast of Labrador (W. E. Stearns); rocky soil, Nachvak and Nain (R. Bell); Hopedale (Weiz); Caribou Island (S. R. Butler).

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CAMPANULACEÆ.

1341. *Campanula uniflora* Linn. Hopedale (Weiz); Nachvak and Cape Chidley (R. Bell).

1344. *Campanula rotundifolia* L., var. *arctica* Lange. Hopedale (Weiz); Middle Bay, Belles Amours, and L'Anse Amour (S. R. Butler); common at Forteau Bay (W. E. Stearns).

ERICACEÆ.

1352. *Vaccinium Pennsylvanicum*, var. *angustifolium* Gray. Nain (Lundberg); Hopedale (Weiz); Caribou Island (Martin, S. R. Butler).

1356. *Vaccinium uliginosum* Linn. Hopedale (Weiz); common on the coast at Nain, Ford's Harbor, and Nachvak (R. Bell); Caribou Island (S. R. Butler).

1358. *Vaccinium cæspitosum* Michx. Hopedale (Weiz); on hill-sides at Belles Amours and on Caribou Island (S. R. Butler).

1364. *Vaccinium Vitis-Idæa* Linn. Hopedale (Weiz); Caribou Island (S. R. Butler).

1365. *Vaccinium Oxycoccus* Linn. Hopedale (Weiz); Caribou Islands (S. R. Butler).

1366. *Vaccinium macrocarpon* Ait. By lakelets along the coast. (Abbé Brunot).

1367. *Chiogenes hispidula* Torr. and Gray. On moss, along the coast (Hooker).

1369. *Arctostaphylos alpina* Spreng. (*Arbutus alpina* Linn.; Weiz' List.) Hopedale (Weiz); Ford's Harbor and Cape Chidley (R. Bell).

1383. *Andromeda polifolia* Linn. Hopedale (Weiz); Caribou Island (S. R. Butler).

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1376. *Cassandra calyculata* Don. Borders of lakelets and swamps along the coast (Hooker); Square Island Harbor (B. P. Mann).

1378. *Cassiope hypnoides* Don. *Andromeda hypnoides* Linn.; Weiz' List. Hopedale (Weiz); Nain and Cape Chidley (R. Bell); coast of Labrador (Dr. Morrison).

1381. *Cassiope tetragona* Don. *Andromeda tetragona* Linn.; Weiz' List. Hopedale (Weiz); coast of Labrador (Colmaster); abundant along the coast at Nain and Nachvak (R. Bell); Caribou Island (S. R. Butler).

1389. *Bryanthus taxifolius* Gray. *Andromeda cærulea* Weiz' List. Hopedale (Weiz); coast of Labrador (Dr. Morrison); Nain, Nachvak, and Ford's Harbor (R. Bell).

1393. *Kalmia angustifolia* Linn. Coast of Labrador (Dr. Morrison).

1394. *Kalmia glauca* Ait. Hopedale (Weiz); Caribou Island (S. R. Butler); coast of Labrador (Dr. Morrison).

1395. *Ledum palustre* Linn. Coast of Labrador (Dr. Morrison); Hopedale (Weiz); Ford's Harbor and Nachvak (R. Bell).

1396. *Ledum latifolium* Ait. Coast of Labrador (Dr. Morrison); Hopedale (Weiz); Caribou Island (S. R. Butler).

1386. *Loiseleuria procumbens* Desv. *Azalea procumbens* Linn.; Weiz' List. Hopedale (Weiz); coast of Labrador (Dr. Morrison); Ford's Harbor (R. Bell).

1402. *Rhododendron Rhodora* Don. Caribou Island (S. R. Butler).

1405. *Rhododendron Lapponicum* Wahl. (*Azalea*

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Lapponica, Weiz' List.) Coast of Labrador (Dr. Morrison); Hopedale (Weiz); on a hill-top at Belles Amours (S. R. Butler); Nachvak (R. Bell).

1409. *Pyrola minor* Linn. Cold woods, Labrador (Dr. Morrison); Hopedale (Weiz).

1410. *Pyrola secunda*, var. *pumila* Gray. Cool boggy ground, Labrador (Storer); Hopedale (Weiz).

1411. *Pyrola chlorantha* Swartz. Coast of Labrador (Dr. Morrison).

1413. *Pyrola rotundifolia* L., var. *pumila* Hook. Hopedale (Weiz); quite common along the northern coast (R. Bell).

1416. *Moneses uniflora* Gray. Coast of Labrador (Dr. Morrison); Hopedale (Weiz); Caribou Island (S. R. Butler).

DIAPENSIACEÆ.

1424. *Diapensia procumbens* Linn. Hopedale (Weiz); coast of Labrador (Dr. Morrison); common on hill-tops, Caribou Island (S. R. Butler); Nain and Ford's Harbor (R. Bell).

PLUMBAGINACEÆ.

1426. *Armeria vulgaris* Willd. Coast of Labrador (Dr. Morrison); Hopedale (Weiz); Nain and Nachvak (R. Bell).

PRIMULACEÆ.

1427. *Primula farinosa* Linn. Hopedale Islands (Weiz); Caribou Island and L'Anse Amour (S. R. Butler).

1428. *Primula Mistassinica* Michx. Bonne Espérance and neighboring islands, and at Forteau (S. R. Butler); Hopedale (Weiz).

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2192. *Primula Egaliksensis* Hornem. Northern Labrador (Turner).

1213. *Trientalis Americana* Pursh. Coast of Labrador (Hooker); Hopedale (Weiz); Caribou Island (S. R. Butler).

GENTIANACEÆ.

1480. *Gentiana Amarella* L., var. *acuta* Hook. Coast of Labrador (Hooker); Caribou Island (S. R. Butler); Hopedale (Weiz).

1482. *Gentiana propinqua* Richards. On hillsides at Amour and lowlands at Bonne Espérance (W. A. Stearns); more likely the preceding species (Macoun).

2194. *Gentiana nivalis* Linn. Labrador, collected by Moravian missionaries (Gray); Hopedale (Weiz).

1500. *Pleurogyne rotata* Griseb. Coast of Labrador (Dr. Gray); on the flats at Caribou, and shores of Esquimaux River, and at Bonne Espérance (S. R. Butler).

1501. *Pleurogyne Carinthiaca* Griseb., var. *pusilla* Gray. Coast of Labrador (Pursh).

1504. *Halenia deflexa* Griseb. Forteau Bay (Miss Brodie); on the hillsides at L'Anse Amour and the lowlands at Bonne Espérance (W. E. Stearns); Caribou Island (S. R. Butler).

1506. *Menyanthes trifoliata* Linn. Coast of Labrador (Dr. Morrison); Hopedale (Weiz); Caribou Island (S. R. Butler).

BORRAGINACEÆ.

1570. *Mertensia maritima* Don. Hopedale (Weiz); Caribou Island (S. R. Butler).

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SCROPHULARIACEÆ.

1674. *Veronica alpina* Linn. Nain (Lundberg; Hopedale (Weiz).

1689. *Castilleia pallida* Kunth, var. *septentrionalis* Gray. (*Bartsia pallida* Linn.; Weiz' List.) Hopedale (Weiz); Ford's Harbor and Nachvak (R. Bell).

1696. *Euphrasia officinalis* Linn. Coast of Labrador (Hooker); Hopedale (Weiz).

Var. *Tatarica* Benth. Coast of Labrador (Pursh); Caribou Island (S. R. Butler).

1697. *Bartsia alpina* Linn. Coast of Labrador (Colmaster); Ungava Bay (McGill Coll. Herb.); Nachvak (R. Bell).

1702. *Pedicularis Grœnlandica* Retz. Coast of Labrador (Dr. Morrison); Nachvak (R. Bell); Hopedale (Weiz).

1704. *Pedicularis Lapponica* Linn. Coast of Labrador (Colmaster); Nachvak (R. Bell); Hopedale (Weiz).

1706. *Pedicularis euphrasioides* Stephan. Coast of Labrador (Colmaster); Hopedale (Weiz); Ford's Harbor (R. Bell).

1714. *Pedicularis hirsuta* Linn. Ford's Harbor and Cape Chidley (R. Bell).

1715. *Pedicularis flammea* Linn. Hopedale (Weiz); coast of Labrador (Colmaster); Ford's Harbor and Nachvak (R. Bell).

1718. *Rhinanthus Cristagalli* Linn. Common along the whole Labrador coast (W. E. Stearns); Caribou Island (S. R. Butler); Hopedale (Weiz).

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LENTIBULARIACEÆ.

1737. *Pinguicula vulgaris* Linn. Ungava Bay (Mrs. Lizzie Crawford); L'Anse Amour Bay (S. R. Butler); Hopedale (Weiz); Nachvak (R. Bell).

1738. *Pinguicula villosa* Linn. Coast of Labrador (Dr. Gray); Hopedale (Weiz).

1739. *Pinguicula alpina* Linn. Coast of Labrador (Steinhauer).

PLANTAGINACEÆ.

1808. *Plantago maritima* Linn. Crevices of rocks, coast of Labrador (Pursh); Hopedale (Weiz); Caribou Island (S. R. Butler); Nachvak (R. Bell).

POLYGONACEÆ.

1869. *Polygonum aviculare* Linn. Hopedale (Weiz).

1892. *Polygonum viviparum* Linn. Hopedale (Weiz); Ford's Harbor and Cape Chidley (R. Bell).

1902. *Oxyria digyna* Campdera (*Rumex digyna* Pursh.; Weiz' List). Hopedale (Weiz); coast of Labrador (Dr. Morrison); Nachvak and Cape Chidley (R. Bell); Caribou Island (S. R. Butler).

1904. *Rumex occidentalis* Watson. Coast of Labrador (Storer); Bonne Espérance (J. A. Allen).

1867. *Kœnigia Islandica* Linn. Hopedale (Weiz).

SANTALACEÆ.

1930. *Comandra livida* Rich. Coast of Labrador (Dr. Morrison); Hopedale (Weiz).

BETULACEÆ.

1977. *Betula papyrifera* Michx. Coast of Labrador (Prof Sargent).

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1979. *Betula pumila* Linn. Coast of Labrador (Hooker).

1981. *Betula glandulosa* Michx. Coast of Labrador (Hooker); Caribou Island (S. R. Butler).

1982. *Betula nana* Linn. Coast of Labrador (Dr. Morrison).

1986. *Alnus viridis* DC. Coast of Labrador (Dr. Morrison); Ford's Harbor (R. Bell).

SALICACEÆ.

2004. *Salix adenophylla* Hook. Coast of Labrador (Dr. Morrison and Bebb).

2007. *Salix arctica* R. Br. Coast of Labrador (Dr. Morrison); Nachvak and Ford's Harbor (R. Bell).

2008. *Salix argyrocarpa* Anders. Ungava Bay (G. Barnston); Forteau Bay and Carrall Cove (Allen).

2010. *Salix balsamifera* Barratt. Chateau and Square Island (Allen).

2012. *Salix candida* Willd. Forteau Bay (Allen).

2013. *Salix chlorophylla* Anders. Nain and Ford's Harbor (R. Bell).

2021. *Salix glauca* Linn. Damp places at Nachvak and Ford's Harbor (R. Bell).

2022. *Salix herbacea* Linn. Coast of Labrador (Dr. Morrison); Nain and Cape Chidley (R. Bell).

2042. *Salix reticulata* Linn. Nachvak and Cape Chidley (R. Bell); coast of Labrador (Dr. Morrison).

2050. *Salix vestita* Pursh. Coast of Labrador (Colmaster); Nachvak (R. Bell).

2051. *Salix Uva-ursi* Pursh. Coast of Labrador (Colmaster); Dead Islands (Allen).

2053. *Populus tremuloides* Michx. On dry slopes in the interior (Hooker).

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EMPETRACEÆ.

2059. *Empetrum nigrum* Linn. (Curlew-berry). Ford's Harbor (R. Bell); Hopedale (Weiz).

CONIFERÆ.

2068. *Juniperus communus*, var. *alpina* Linn. Coast of Labrador (Hooker).

2082. *Picea nigra* Link. Not uncommon (Hooker).

2083. *Picea alba* Link. Not uncommon (Hooker).

2094. *Larix Americana* Michx. Swampy soil (Hooker).

ORCHIDACEÆ.

2221. *Listera cordata* R. Br. Coast of Labrador (Morrison); Hopedale (Weiz).

2243. *Habenaria hyperborea* R. Br. Caribou Island (S. R. Butler).

2248. *Habenaria obtusata* Rich. Caribou Island (S. R. Butler).

2246. *Habenaria dilatata* Gray. Hopedale Islands (Weiz).

IRIDACEÆ.

2270. *Iris Hookeri* Penny. (*I. sibirica* Weiz' List.) Hopedale Island (Weiz).

LILIACEÆ.

2287. *Streptopus amplexifolius* Dc. Caribou Island (S R. Butler).

2288. *Streptopus roseus* Michx. Caribou Island (S. R. Butler); Hopedale (Weiz).

2289. *Smilicina stellata* Desf. Caribou Island (S. R. Butler).

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2293. *Smilicina trifolia* Desf. Caribou Island (S. R. Butler).

2294. *Maianthemum Canadense* Desf. Caribou Island (S. R. Butler).

2329. *Tofieldia borealis* Wahl. Ford's Harbor (R. Bell); coast of Labrador (Hooker); Hopedale (Weiz).

2341. *Clintonia borealis* Raf. Caribou Island (S. R. Butler).

JUNCACEÆ.

2367. *Juncus triglumis* Linn. Ungava Bay (G. Barnston).

2369. *Juncus castaneus* Smith. Ungava Bay (G. Barnston).

2389. *Luzula spadicea*, var. *parviflora* Meyer. Nain and Nachvak (R. Bell).

2394. *Luzula spicata* Desv. Ungava Bay (G. Barnston); Ford's Harbor (R. Bell).

2396. *Luzula arcuata* Meyer. Ungava Bay (G. Barnston); Nachvak (R. Bell).

TYPHACEÆ.

2401. *Sparganium simplex* Huds. Caribou Island (S. R. Butler).

2403. *Sparganium hyperboreum* Laest., var. *Americanum* Beeby. Caribou Island (S. R. Butler).

NAIADACEÆ.

2424. *Triglochin palustre* Linn. Caribou Island (S. R. Butler).

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2425. *Triglochin maritimum* Linn. Coast of Labrador (Dr. Morrison).

CYPERACEÆ.

2489. *Eriophorum vaginatum* Linn. Hopedale (Weiz); Caribou Island (S. R. Butler); Bonne Espérance (Allen); Dumpling Harbor (Mann).

2490. *Eriophorum russeolum* Fries. Caribou Island (S. R. Butler, Martin); Hopedale (Weiz); Forteau (Allen); Nain (Lundberg).

2491. *Eriophorum polystachyon*, var. *angustifolium* Gray. Hopedale (Weiz).

Eriophorum Scheuchzeri Hoppe. Coast of Labrador (Martin); Nain (Lundberg).

2476. *Scirpus cæspitosus* Linn. Hopedale (Weiz).

2556. *Carex canescens* Linn. Caribou Island (S. R. Butler).

2564. *Carex lagopina* Wahl. Maritime rocks, Labrador (Allen).

2566. *Carex pratensis* Drejer. Middle Bay, Labrador (Allen).

2598. *Carex vulgaris*, var. *hyperborea* Boott. Nain and Ford's Harbor (R. Bell).

2604. *Carex lenticularis* Michx. Coast of Labrador, Lat. 51° 30′ (Allen).

2608. *Carex salina* Wahl. Coast of Labrador (Bailey).

2609. *Carex ambusta* Booth. Ungava Bay, North Labrador (Bailey).

2617. *Carex Magellanica* Lamarck. Caribou Island (S. R. Butler).

2618. *Carex rariflora* Smith. Coast of Labrador (Miss Brodie and Allen).

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2627. *Carex vaginata* Tausch. Northern Labrador (Turner).

2672. *Carex oligosperma* Michx. Swamps on the coast of Labrador (Allen).

2674. *Carex miliaris* Michx. Ungava Bay (Turner).

2678. *Carex rotundata* Wahl. Ungava Bay (Turner).

GRAMINEÆ.

2726. *Hierochloa alpina* Roem. and Schultes. Ford's Harbor (R. Bell); Ungava Bay (G. Barnston).

2807. *Deschampsia alba* Roem. and Schultes. Ungava Bay (G. Barnston); Nain (R. Bell).

2812. *Trisetum subspicatum*, var. *molle* Gray. Nain (R. Bell).

2848. *Poa alpina* Linn. Nain and Cape Chidley (R. Bell).

2854. *Poa cenisia* All. Ford's Harbor (R. Bell).

2905. *Festuca ovina*, var. *brevifolia* Watson. Ford's Harbor (R. Bell).

2949. *Elymus mollis* Trin. Nain and Ford's Harbor (R. Bell).

EQUISETACEÆ.

Equisetum sylvaticum Linn. Hopedale (Weiz); Caribou Island (S. R. Butler).

Equisetum arvense Linn. Hopedale (Weiz).

FILICES.

Botrychium Lunaria Swartz. Caribou Island (S. R. Butler); Hopedale (Weiz).

Cystopteris fragilis Bernh. Nain (R. Bell).

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Polypodium Dryopteris Linn. Caribou Island (S. R. Butler).

LYCOPODIACEÆ.

Lycopodium Selago Linn. Nain and Ford's Harbor (R. Bell).

Lycopodium lucidulum Michx. Caribou Island (S. R. Butler).

APPENDIX.

The following notes and corrections to this chapter have been made by Mr. Sereno Watson, who kindly read the proof in the absence of Prof. Macoun. Proof of pp. 448–459 was read after the pages had been printed. Mr. Watson writes me that the earliest paper on the Labrador flora was one by Schrank in the first volume of the Regensburg "Flora" (1818), on some plants sent to Schreber by the Danish missionary Kohlmeister*. It was not completed, however. Meyer's list includes 198 species.

P. 448, line 5, for *plantes* read *plantis*.

P. 448, line 14, for Ance read Anse.

P. 451, line 15, for *cornuti*, Linn. read *polyganum*, Muhl.

P. 451, line 23, dele See *R. Americanus* (J. M.).

P. 452, line 20, for *Draba alpina* Var. (?) *corymbosa*, Durand, read *Draba Fladnitzensis*, Wulf.

P. 452, line 21, add Dead Islands (J. A. Allen).

P. 452, line 24, after Labrador (Pursh), add from the next line, Nachvak, coast of Labrador (R. Bell).

* Spelt Colmaster in the foregoing list.

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P. 452, line 25, dele Var. *confusa* Poir.

P. 452, line 26, dele Hopedale (Weiz).

P. 452, line 27, for *Draba* read Var.; and for Michx. read Watson.

P. 453, line 10, dele *sylvestris* Regd. V.

P. 453, line 11, for Weiz' List read Gray.

P. 454, line 27, for *Spergularia salina* Presb. read *Buda borealis* Watson.

P. 454, line 28, add Bonne Espérance (J. A. Allen).

P. 455, lines 5, 6, for and the arctic regions (Dr.) read Schweinitz in Herb. Gray.

P. 455, line 10, add Ungava Bay (L. M. Turner); Square Island (J. A. Allen).

P. 455, line 11, for Mott read Nutt.

P. 455, line 13, for *maritimum* read *maritimus*, and dele *Pisum maritimum* Linn. Weiz' List.

P. 455, line 20, after Caribou Island insert (S. R. Butler).

P. 457, line 10, dele *Canadensis* Var. (?); and for I & Gr. read Roem.

P. 457, line 30, for Hit. read Kit.

P. 459, line 6, dele *palustre* Linn. Var.; and for Gray read Muhl.

P. 459, line 10, for Hoffm. read Linn.

P. 459, line 14, for Archangelica read *Cœlopleurum*; and for Db. read Lecheb.

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CHAPTER XVII.

BIBLIOGRAPHY OF BOOKS AND ARTICLES RELATING TO THE GEOGRAPHY AND CIVIL AND NATURAL HISTORY OF LABRADOR.

THIS list is merely a tentative one, and will doubtless be found quite imperfect, especially in titles relating to early discovery, and early maps and charts. The author is indebted for certain titles, also for advice, to Dr. Franz Boas, who has kindly lent him Chavanne's "The Literature on the Polar Regions of the Earth," from which a number of titles have been copied. Acknowledgment of aid should also be made to Mr. W. F. Ganong for titles of the North American Pilot. The titles of the works of Ramusio, Eden, Gilbert, Frobisher, and Hakluyt have not been included.

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Northern Labrador, Greenland with Baffin's Bay, Straits Davis's and Hudson. Amsterdam, P. Mortier, 1700.

Canada et pays voisin. Par Guillaume Delisle, Premier Géographe du Roi. Paris, 1703.

A Collection of charts of the coasts of New Foundland and Labrador, with the particular plans of the principal harbors. Drawn from original surveys taken by

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James Cook and M. Lane, and J. Gilbert . . . . chiefly engraved by Thomas Jefferys, geographer to the king. London, J. Jefferys, 1766–1770.

Arrowsmith (*A.*). Northern seas between Europe and America, including the American coast (New Foundland, Labrador, and Greenland). London, 1808. (Name of Hamilton Inlet applied to Invuctoke Bay.)

The North American pilot | for Newfoundland, Labrador, | the Gulf and River St. Lawrence: | being a collection of | sixty accurate charts and plans, | drawn from original surveys: | taken by | James Cook and Michael Lane, surveyors, | and Joseph Gilbert, and other officers in the king's service. | Published by permission of the | Right Hon. the Lords Commissioners of the Admiralty: | chiefly engraved by | the late Thomas Jefferys, geographer to the king. | On thirty-six large copper-plates. | London: | Printed according to Act of Parliament and sold by R. Sayer and J. Bennett, No. 53, in Fleet Street. | MDCCLXXIX. | N.B. Of whom may be had Sailing Directions to the above charts.

A new and enlarged edition of this work was published in 1799, containing 61 charts on 37 copper-plates. Printed and published by Robert Laurie and James Whittle.

(The edition of which the title is quoted above seems to be simply a reprint of the 1st edition, which appeared in 1775. I have not been able to see a copy of the latter, but from its title on Harvard College Library Catalogue cards, think the title is exactly as given below.

Sailing directions | for this | North American Pilot: | containing the | Gulf and River St. Lawrence, | the whole island of Newfoundland, | including | the Strait

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of Belle Isle, | and the coast of Labrador. | Giving a particular account, etc. | London. | Printed for R. Sayer and J. Bennett. | MDCCLXXV. |

(Small 4to. Divided into sections, each paged separately. 148 pp. in all.)

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APPENDIX TO CHAPTER XI.

Recent Explorations.—Rediscovery of the Grand Falls.

On page 231 we referred to Mr. Randle Holme's ascent of the Grand River, to a point within fifty miles of the Grand Falls, which he claimed to be "the most stupendous falls in the world," giving a greatly exaggerated estimate of their height. During the summer of 1891, the Bowdoin College expedition to Labrador, in charge of Professor Leslie A. Lee, sent a party up the Grand River, which happily solved the mystery which has hung over the subject, and thus achieved the most important geographical discovery which has been made in the interior of Labrador since the first discovery of this cataract by white men. The following account has been prepared from dispatches, sent to the daily press, and has been kindly revised by Professor Lee and Mr. Cary.

The expedition left Rockland, Me., early in July in the Julia Decker, a schooner of ninety tons, the party consisting of nineteen members.

The party left Rigolet for Grand River, July 27, equipped with two Rushton boats, a kodak, surveying instruments, fire-arms, and provisions for a month. E.

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B. Young and D. M. Cole were in one boat; W. R. Smith and Austin Cary, who was chief of the exploring party, in the other.

Twenty-five miles from the mouth of the river the first falls were reached. They make a descent of 70 feet in two leaps, and necessitate a portage up a steep ascent of 210 feet, then half a mile through woods, and finally a descent to the river of 140 feet. With much labor this portage was accomplished in four hours. A cache of provisions was made below the falls. Then the struggle began. Up to this point the current had been easy and the river about a mile wide; but above the falls the river narrowed somewhat and the current became swifter, so that tracking was rendered necessary at times. This was no small labor, as the banks are rugged and jagged rocks, bowlders and fallen timber obstructed the way of the trackers. After a struggle of forty miles of this sort the Gull Island Rapids presented a still more serious difficulty in the way of tracking. Here the boats had to be lightened and guided through a short but extremely difficult rapid—a slow and laborious task. For a distance of fifteen miles above, the river flowed very swiftly between high wooded banks, rendering rowing very often impossible and tracking difficult.

After this the next hard work was in the Horseshoe Rapids. In these a most unfortunate accident happened to one of the boats. While tracking around a turn the boat in charge of Cary and Smith was over-turned, the keel and sharp prow ill adapting it to such rapid water. A large part of the provisions, cooking utensils, the shot-gun, the barometer, and a revolver were lost. But though crippled the party were undismayed and pushed on up

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to the Mininipi Rapids, the most formidable of all except the Gull Island Rapids. The route here laid through a burnt district. Precipitous banks lined the river and the current was very fierce. After a stretch of smooth water and then alternate rowing and tracking, next in succession came the Mouni Rapids, which were comparatively easy. Between the Mininipi and the Mouni another cache was made. After passing the Mouni Rapids the voyagers glided into Lake Waminikapou, a most beautiful sheet of water 40 miles in length and 150 miles from the mouth of the river. The scenery here was simply grand. High precipitous shores studded with high groves, towered six or eight hundred feet above the placid bosom of the lake.

Holme in 1887 had succeeded in reaching the middle of the lake when he was obliged to relinquish his undertaking, estimating his distance from the falls at 50 miles, 20 of which would have been in the dead water of the lake.

The Bowdoin party had a comparatively easy time rowing across, and had pushed five miles beyond when a halt was called because of the disablement of one of the party. For some days Young had been suffering from a severe sore on his hand, which, irritated by rowing and aggravated by exposure, was beginning to develop serious symptoms and was very painful. Owing to this and the loss of provisions in the Horseshoe Rapids it was decided to divide the party—Cole to continue with Cary, and Young and Smith to return. Up to this time the party had been eleven days on the river. Young and Smith made the return to the mouth in five days without incident. They were well received by Mr.

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McLaren, Hudson Bay Co.'s factor at Northwest River, and thence were conveyed across Lake Melville in a yawl, with their Rushton boat in tow. During the night a severe storm arose and filled the Rushton, making it necessary to cut it loose. Parties going up the lake some days later found the boat dashed to pieces on the rocks. Young and Smith reached Rigolet August 18, and found very comfortable quarters with Mr. Bell, factor of the Hudson Bay Co., who showed them every kindness.

Meanwhile Cary and Cole pushed on for sixty-five miles, finding the distance much farther than it had been estimated. Most of this was made in easy rowing water, but tracking was necessary for the last eight or ten miles. At this point a short reconnoitre satisfied the men that it would be impossible to proceed farther with the boat because of the extremely heavy water above. Consequently a cache was made of the boat, and all unnecessary luggage and provisions, and the two men struck out through the woods to gain the plateau, which was a very arduous task. Upon reaching the table-land a mountain, rising from five to eight hundred feet from the surface, was sighted about six miles away; and as it was the highest land anywhere around they ascended to get a view of their surroundings. The whole country was spread out beneath them, but there was as yet no sign of the falls. They called this mountain Mt. Hyde in honor of the president of Bowdoin College. Bearings were taken from the summit and an attempt made of surveying, but the black-flies became intolerable and compelled them to beat a retreat to the river valley, where they camped for the night. Next day the journey

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was continued for seven miles along the river to a point where the river issues from a remarkable gorge, worn out of the solid Archæan rock five hundred feet or more in depth and from 150 feet to a quarter of a mile in width.

Once more they were obliged to take to the high ground, and for the rest of that day and part of the next skirted the gorge. They were proceeding in this manner when a distant rumbling led them to approach the river. It was flowing at their own level. Below them were the long-sought-for falls, and three cheers for Bowdoin immediately mingled with their roar.

As was expected, reports concerning them were greatly exaggerated. The falls themselves are 150 feet wide and do not exceed 150 feet in height. For five or six miles above was a series of heavy rapids with several smaller falls varying from 10 to 25 feet in height and making about 100 feet more fall. The water, as it approached the brink of the Grand Falls, makes a long, graceful bend downward and then shoots straight downward into the canon. The river above the falls flows almost due south by compass (really S. E.) while immediately upon striking the bottom of the gorge it makes a sharp turn to the east and continues in that direction for several hundred yards when it again resumes its general southeasterly course, and goes roaring down the canon in heavy rapids. Although reports concerning them were greatly exaggerated, the falls were found to be truly grand. But probably the most remarkable feature of all is the great gorge, worn as it is in the solid granite. It is probably one of the oldest drainage lines in the world. This was named the Bowdoin Canon.

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Several hours were spent at the falls measuring and photographing, but the results are as yet not available.

The Labrador Plateau has been estimated by other parties to be 2,000 feet above the sea-level, but owing to the loss of the barometer our men were unable to determine the accuracy of this estimate. The plateau is for the most part level with occasional prominences. It is well wooded with spruce timber, the largest of which are perhaps eight inches through. A heavy carpet of moss lies underfoot and there is very little underbrush to make travelling difficult. Innumerable lakes dot the surface in all directions, a large chain of which are undoubtedly drained by the Grand River. The black-flies on the high ground were terrible.

The falls were reached on the morning of the 13th of August. On the next day the successful explorers started to retrace their course of 300 miles. They had reached the end of their provisions and were worn out and hungry. On the afternoon of the 15th, with no little joy, they sighted the location of their cache of boat, luggage, and provisions. But their joy was soon turned to dismay, for, instead of the pleasant sight they had expected, nothing but smoking and charred remains greeted their eyes. Rifle, ammunition, instruments, boat, provisions—everything that had been left behind was burned, and there they were nearly 300 miles from the mouth of the river. It is supposed that the camp-fire still hung in the moss and peat soil after it was thought to be completely extinguished, and later revived and spread to the cache.

About three pints of parched flour and as much rice, together with one can each of burned baked beans and

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tongue, a 32-calibre revolver, a small axe, fish-line, and a few matches were all they had to rely upon for a safe voyage back, nor did the resources of the country warrant them in expecting much from that quarter. For eight days the two men built rafts, tramped and floated down the river, travelling a distance of 150 miles with no other food than the above-mentioned provisions, an occasional squirrel, and berries. Black-flies harried them terribly, and made their condition almost unbearable. At last the cache between the Mininipi and Mouni Rapids was reached. From this they obtained five pounds of buckwheat and a can of tongue to last them for the next seventy-five miles to the cache below the first falls. By continual rafting and tramping they reached the cabin of an old trapper, near the mouth of the river, August 29th, ragged and shoeless and much worn with hardships and privations. Thence they were conveyed to Northwest River, where they received kind treatment at the hands of Mr. McLaren, and from there went across Lake Melville to Rigolet in a yawl, arriving on the afternoon of September 1st. The main expedition had been waiting for them in that vicinity for six days, and was beginning to get anxious, for they were due August 25th, and according to the report brought back by Young and Smith were likely to be on time. When at last they did arrive they were welcomed on board with every demonstration of joy.

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